

Welcome to your CDP Climate Change Questionnaire 2020

C0. Introduction

C0.1

(C0.1) Give a general description and introduction to your organization.

First Solar, Inc. is a leading global provider of comprehensive photovoltaic (PV) solar energy solutions with over 25 gigawatts (GW) sold worldwide. We are the world's largest thin film PV solar module manufacturer and are the only American company among the world's ten largest PV manufacturers. We operate our business in two segments. Our modules segment involves the design, manufacture, and sale of our advanced thin film solar modules, which convert sunlight into electricity. Third-party customers of our modules segment include integrators and operators of PV solar power systems. Our second segment is our systems segment, through which we provide power plant solutions, which include (i) project development, (ii) engineering, procurement, and construction ("EPC") services, and (iii) O&M services. In addressing the overall global demand for electricity, our high-efficiency advanced thin film modules, which leverage our Series 6™ ("Series 6") module technology, and power plant solutions compete favorably on an economic basis with fossil fuel-based forms of electricity generation and provide low-cost electricity to end users. From raw material sourcing through end-of-life module recycling, First Solar's PV modules and systems protect and enhance the environment. Our vision is to lead the world's sustainable energy future and our mission is to provide cost-advantaged solar technology through innovation, customer engagement, industry leadership, and operational excellence.

First Solar's proven solar solutions diversify the energy portfolio and reduce the risk of fuel-price volatility while delivering a levelized cost of electricity (LCOE) that is cost competitive with fossil fuels today. First Solar has set the benchmark for environmentally responsible product life cycle management by introducing the industry's first global and comprehensive recycling program for solar modules. We are committed to minimizing the environmental impacts and enhancing the social and economic benefits of our products and projects across their life cycle, from raw material sourcing through product end-of-life. For more information about First Solar, please visit www.firstsolar.com

First Solar was founded in 1999 and began commercial production in 2002. Since 2002 and through 2019, we have sold over 25 GW of PV solar modules. Assuming average worldwide irradiance and grid electricity emissions, our products are being used to displace over 17 million metric tons of CO₂e per year during their 25+ year product life. This is equivalent to powering more than 12 million average homes, planting 290 million trees and saving 45 billion liters of water (or 18,000 Olympic swimming pools) per year based on worldwide averages.

C0.2

(C0.2) State the start and end date of the year for which you are reporting data.

	Start date	End date	Indicate if you are providing emissions data for past reporting years
Reporting year	January 1, 2019	December 31, 2019	No

C0.3

(C0.3) Select the countries/areas for which you will be supplying data.

- Chile
- Germany
- India
- Japan
- Malaysia
- Samoa
- United States of America
- Viet Nam

C0.4

(C0.4) Select the currency used for all financial information disclosed throughout your response.

- USD

C0.5

(C0.5) Select the option that describes the reporting boundary for which climate-related impacts on your business are being reported. Note that this option should align with your chosen approach for consolidating your GHG inventory.

- Equity share

C1. Governance

C1.1

(C1.1) Is there board-level oversight of climate-related issues within your organization?

- Yes

C1.1a

(C1.1a) Identify the position(s) (do not include any names) of the individual(s) on the board with responsibility for climate-related issues.

Position of individual(s)	Please explain
Board-level committee	The Audit Committee of the Board of Directors has the highest level of oversight over risk management for the company. The annual enterprise risk assessment process includes identifying risks that would impact the company's achievement of strategic objectives. Thus, the assessment would consider climate-related risks as part of the enterprise risk management process.

C1.1b

(C1.1b) Provide further details on the board's oversight of climate-related issues.

Frequency with which climate-related issues are a scheduled agenda item	Governance mechanisms into which climate-related issues are integrated	Please explain
Scheduled – some meetings	Reviewing and guiding strategy Reviewing and guiding risk management policies	Sustainability updates to the Board are scheduled on an annual or more frequent basis. Enterprise risk management updates are provided to the Board's Audit Committee at least annually or more frequently. Impacts, risks, mitigation efforts, and opportunities related to Climate Change may be included in these updates if they have a significant impact on the company's business and operations.

C1.2

(C1.2) Provide the highest management-level position(s) or committee(s) with responsibility for climate-related issues.

Name of the position(s) and/or committee(s)	Responsibility	Frequency of reporting to the board on climate-related issues
Chief Executive Officer (CEO)	Both assessing and managing climate-related risks and opportunities	Annually

C1.2a

(C1.2a) Describe where in the organizational structure this/these position(s) and/or committees lie, what their associated responsibilities are, and how climate-related issues are monitored (do not include the names of individuals).

First Solar's Chief Executive Officer (CEO) had the highest level of direct responsibility for climate change within the company and is the top owner of enterprise risk. Leveraging sustainability as a business enabler was one of the CEO's executive goals which was cascaded

to the Chief Operations Officer, Chief Sustainability Officer and global sustainability team. First Solar's Chief Sustainability Officer reports into the Chief Operational Officer and is in charge of overseeing the company's global Environmental Health and Safety (EHS), Sustainability and Recycling programs. The Chief Sustainability Officer provides regular sustainability updates to the executive leadership team and the Board.

First Solar's Chief Sustainability Officer also led the company's Sustainability Council which is composed of senior leaders from Supply Chain, Government Affairs, Sustainability, EHS, Business Development, Technology & Product Development, Legal, Human Resources, Finance, as well as the Chief Operating Officer and the Chief Technology Officer. The Sustainability Council promotes the implementation of cross-functional sustainability strategies and drives the company's sustainability goals, initiatives and programs with a focus on resource efficiency, supply chain risk management, transparency, and utilizing sustainability as a lever for growth. First Solar's corporate sustainability program drives the company's commitment to the triple bottom line of "people, planet and profit" through our approach to responsible life cycle management, environmental footprint analysis (from raw material sourcing through end-of-life recycling), greenhouse gas emissions intensity reduction, waste management, global charitable giving, operational cost reduction, global PV module recycling services, as well as our internal sustainability ambassadors program.

C1.3

(C1.3) Do you provide incentives for the management of climate-related issues, including the attainment of targets?

	Provide incentives for the management of climate-related issues	Comment
Row 1	Yes	

C1.3a

(C1.3a) Provide further details on the incentives provided for the management of climate-related issues (do not include the names of individuals).

Entitled to incentive	Type of incentive	Activity incentivized	Comment
All employees	Monetary reward	Other (please specify) Renewable energy products	Expansion of PV solar module production which enables more PV solar modules to be provided to customers and therefore to displace more electricity generation by fossil fuels. Our annual manufacturing capacity has grown from 25 megawatts (MW) in 2005 to more than 5,500 MW of Series 6 capacity at the end of 2019.
All employees	Monetary reward	Other (please specify)	First Solar incentivizes initiatives which drive reductions in PV solar module manufacturing costs and in turn reduce the costs of PV solar, enabling PV

		Renewable energy cost	solar to be cost competitive with conventional technologies and become more widely deployed and accepted.
All employees	Monetary reward	Efficiency target	<p>First Solar provides incentives to encourage our associates to drive the company's environmental strategy and continuous improvement. Improvements in PV solar module efficiency drive reductions in the costs of PV solar thereby expanding PV markets and displacing electricity generated by fossil fuels. Our module conversion efficiency has improved on average more than half a percent every year for the last ten years. Improvements in efficiency also reduce the overall lifecycle carbon footprint of our product. Through continued operational improvements and execution of our efficiency improvement roadmap, by year-end 2019, our average watts-per-module had increased to 431 watts on a fleetwide basis. Today, we are consistently producing 440-watt modules and have recently certified a record production module at 447 watts, which was manufactured on a commercial production line.</p>
All employees	Monetary reward	Other (please specify) Expansion of renewable energy	Expanded PV markets and/or market segments (which help to develop emerging geographic markets for PV solar) and provide these markets with a cost-competitive alternative to electricity generated by fossil fuels.
Management group	Non-monetary reward	Behavior change related indicator	<p>Participation in leadership development programs, such as First Solar Way and Leadership Essentials, that focus on driving product improvements which helps to lower the carbon intensity of our products and also include other sustainability-related projects. In 2019, a leadership essentials team evaluated the business case for going 100% renewable in Ohio and found that it was not only feasible, but also cost-effective. In 2020, First Solar announced its commitment to power 100% of its global operations with renewable energy by 2028 and pledged to transition its U.S. facilities to carbon-free electricity by 2026. Leadership Essentials is a learning experience program designed for First Solar's mid-level managers to develop critical leadership and business acumen skills. Participants are placed in teams that are assigned to find solutions to critical challenges, giving them an opportunity to develop and present</p>

			recommendations to the company's executive leadership. These programs are some of the many ways that we invest in our people so they can continue to drive innovation and change, bringing us closer to our vision of leading the world's sustainable energy future.
Facilities manager	Monetary reward	Energy reduction target	Energy saving targets are included in the performance goals of our facilities team. In 2019, our manufacturing energy intensity (energy consumption per watt produced) decreased by 36% compared to 2018 primarily due to the increased throughput and efficiency of our Series 6 manufacturing process. First Solar's manufacturing energy intensity includes all processes, from the beginning of our manufacturing process to finished module.
Chief Executive Officer (CEO)	Monetary reward	Other (please specify) Executive sustainability goal	Leveraging sustainability as a business enabler is one of the CEO's executive goals which includes managing risks and identifying opportunities for growth e.g. operation cost reduction through reduced resource consumption and emissions. Executives are rewarded for achieving their operational goals and objectives.
All employees	Non-monetary reward	Behavior change related indicator	First Solar's internal Sustainability Ambassadors Program enables First Solar associates at various sites to identify and implement local sustainability initiatives while encouraging sustainable behavior change across the organization. First Solar Sustainability Ambassadors are recognized for their efforts to recycle and reduce waste as part of the company's global reduce-reuse-recycle campaign, conserve natural resources, engage in local communities, and minimize both the company's and their personal environmental footprints.

C2. Risks and opportunities

C2.1

(C2.1) Does your organization have a process for identifying, assessing, and responding to climate-related risks and opportunities?

Yes

C2.1a

(C2.1a) How does your organization define short-, medium- and long-term time horizons?

	From (years)	To (years)	Comment
Short-term	0	3	Time horizon for assessing climate-related risks and opportunities is aligned with other business practice time horizons.
Medium-term	3	5	We evaluate medium and long term horizons as well, with regard to our module warranties. We provide a limited PV solar module warranty covering defects in materials and workmanship under normal use and service conditions for approximately 10 years. We also typically warrant that modules installed in accordance with agreed-upon specifications will produce at least 98% of their labeled power output rating during the first year, with the warranty coverage reducing by 0.5% every year thereafter throughout the approximate 25-year limited power output warranty period. These warranties are influenced by climatic conditions, which we need to anticipate in our product design cycles and evaluations.
Long-term	5	10	We evaluate medium and long term horizons as well, with regard to our module warranties. We provide a limited PV solar module warranty covering defects in materials and workmanship under normal use and service conditions for approximately 10 years. We also typically warrant that modules installed in accordance with agreed-upon specifications will produce at least 98% of their labeled power output rating during the first year, with the warranty coverage reducing by 0.5% every year thereafter throughout the approximate 25-year limited power output warranty period. These warranties are influenced by climatic conditions, which we need to anticipate in our product design cycles and evaluations.

C2.1b

(C2.1b) How does your organization define substantive financial or strategic impact on your business?

Our definition for a substantive financial impact is a major impact on business, strategy, reputation, operational milestones, talent loss, or financial loss e.g. direct loss or opportunity cost of more than \$50 million (medium-high impact) to more than \$100 million (high impact).

C2.2

(C2.2) Describe your process(es) for identifying, assessing and responding to climate-related risks and opportunities.

Value chain stage(s) covered

Direct operations
Upstream
Downstream

Risk management process

Integrated into multi-disciplinary company-wide risk management process

Frequency of assessment

Annually

Time horizon(s) covered

Short-term

Description of process

First Solar conducts an annual survey to obtain the company leadership's view of enterprise risks and risk trends over a three-year horizon. Functional leaders (VP-level and above) and risk owners are requested on an annual basis to complete the survey. Risk owners may provide their own updates more frequently if needed. Risks are assessed on their likelihood, impact and velocity, based on residual risk, i.e. remaining risk after action and control activities to reduce the impact and likelihood of an adverse event have been undertaken. 24 risk statements were captured in the 2019 survey, including areas such as regulatory risks, operational risks, reputational risks, market/customer changes, technology risks, supply chain, organizational adaptability, and corporate sustainability. These include climate change related risks and opportunities such as regulatory and other market drivers, uncertainty in market signals, commodity price risks, corporate sustainability, and natural disasters. The survey input is then converted into a heatmap chart depicting each risk's likelihood and impact. In 2020, we began also highlighting top risks with the highest velocity factor. The results are reviewed and analyzed by the executive leadership team and the Board's Audit Committee to guide the company's risk mitigation efforts. Updates to the annual survey are made semi-annually and provided to the Board's Audit Committee. Impacts, risks, and opportunities related to Climate Change may be included in these updates if they have a significant impact on the company's business and operations. Risks associated with individual assets (including risks due to weather and other extreme events) are assessed in the context of operational and/or business continuity risks. Asset level risks (e.g. natural disasters that affect individual facilities) and opportunities are assessed through semi-annual scorecards for our manufacturing sites.

C2.2a

(C2.2a) Which risk types are considered in your organization's climate-related risk assessments?

	Relevance & inclusion	Please explain
Current regulation	Relevant, always included	Climate change related risks associated with current regulations (e.g. the reduction or removal of clean energy programs and incentives which could result in decreased demand for our products) are captured under regulatory risks and are always included for evaluation in the company's ERM survey.
Emerging regulation	Relevant, always included	Risks associated with emerging regulations (e.g. new government regulations or utility policies pertaining to our modules, systems, and operation and maintenance services which could result in significant additional expenses or reduced product demand) are captured under regulatory risks and are always included for evaluation in the company's ERM survey.
Technology	Relevant, always included	Technology risks (e.g. failing to enhance our technology and reduce costs could render our solar modules or systems uncompetitive) are always included for evaluation in the company's ERM survey.
Legal	Relevant, always included	Legal risks (e.g. failure to comply with legal or regulatory requirements including but not limited to Foreign Corrupt Practices Act, environmental, health and safety, anti-trust, misappropriating or infringing on intellectual property rights of third parties which could adversely impact our financial position or damage our reputation) are always included for evaluation in the company's ERM survey.
Market	Relevant, always included	Market risks (e.g. if utility-scale PV solar technology proves unsuitable for widespread adoption at economically attractive rate of return or if additional demand for solar modules and systems takes longer to develop than we anticipate) are always included for evaluation in the company's ERM survey.
Reputation	Relevant, always included	All ERM risks are evaluated for their potential impact on the company's reputation. A specific example of potential reputational risks would be problems with product quality and performance of our Series 4 and Series 6 modules which could cause us to incur significant and/or unexpected warranty and related expenses, damage our market reputation, and prevent us from maintaining or increasing our market share.
Acute physical	Relevant, always included	Risks associated with individual assets (including risks due to weather and other extreme events which could disrupt operations or the supply of raw materials) are assessed in the context of operational and/or business continuity risks and are included in the "catastrophic event" category of the company's ERM survey. Asset level risks (e.g. natural

		disasters that affect individual manufacturing facilities) are assessed through semi-annual scorecards for our manufacturing sites.
Chronic physical	Relevant, always included	Chronic physical climate change risks such as water shortages and widespread extreme climates are included for evaluation in the company's ERM survey and the semi-annual scorecards for our manufacturing sites which assess operational and/or business continuity risks. As we increase the number of installations in extreme climates, we may experience increased failure rates due to deployment into such field conditions. Any widespread product failures may damage our market reputation, cause our net sales to decline, require us to repair or replace the defective modules or provide financial remuneration, and result in us taking voluntary remedial measures beyond those required by our standard warranty terms to enhance customer satisfaction, which could have a material adverse effect on our operating results.

C2.3

(C2.3) Have you identified any inherent climate-related risks with the potential to have a substantive financial or strategic impact on your business?

Yes

C2.3a

(C2.3a) Provide details of risks identified with the potential to have a substantive financial or strategic impact on your business.

Identifier

Risk 1

Where in the value chain does the risk driver occur?

Direct operations

Risk type & Primary climate-related risk driver

Current regulation

Other, please specify

reduction, elimination, or expiration of government subsidies, economic incentives, tax incentives, renewable energy targets, policies and other support for on-grid solar electricity applications

Primary potential financial impact

Decreased revenues due to reduced demand for products and services

Company-specific description

Although we compete in key markets that do not require government subsidies or support programs to support the competitiveness of solar, our net sales and profits

remain subject, in the near term, to regulation and variability based on the availability and size of government subsidies and economic incentives (e.g. quotas, renewable portfolio standards, and tendering systems) and financial incentives (e.g. tax incentives, grants, loans, rebates, and production incentives). To the extent these support programs are reduced earlier than previously expected or are changed retroactively, such changes could negatively impact demand and/or price levels for our solar modules and systems, lead to a reduction in our net sales, and adversely impact our operating results. Although we expect to become less impacted by, and less dependent on these forms of government support over time, such programs will continue to play varying roles in accelerating the adoption of PV solar power systems around the world. The Investment Tax Credit (ITC) has been an important economic driver of solar installations in the U.S. and its extension has contributed to greater medium-term demand. The positive impact of the ITC depends to a large degree on the availability of tax equity for project financing, and any significant reduction in the availability of tax equity in the future could make it more difficult to develop and construct projects requiring financing. In addition, policies of the U.S. presidential administration may create regulatory uncertainty in the renewable energy industry, including the solar industry, and our business, financial condition, and results of operations could be adversely affected. Members of the U.S. presidential administration have made public statements that indicate that the administration may not be supportive of various clean energy programs and initiatives designed to curtail climate change.

Time horizon

Short-term

Likelihood

Likely

Magnitude of impact

High

Are you able to provide a potential financial impact figure?

Yes, an estimated range

Potential financial impact figure (currency)

Potential financial impact figure – minimum (currency)

0

Potential financial impact figure – maximum (currency)

110,000,000

Explanation of financial impact figure

The Investment Tax Credit (ITC) has been an important economic driver of solar installations in the U.S. which represented 87% of our net sales in 2019. Under a worst case scenario, if we assumed 87% of our gross profit (~\$549 million) or ~\$477 million was impacted by a change in support policies in the U.S. and assume a 30% reduction in the value on goods and services sold (that would have otherwise qualified for the

ITC), the maximum potential financial impact is estimated to be ~110 million. The more likely impact to our results would be much lower than this worst case scenario.

Electricity load growth driven by EVs and green hydrogen, customer demand for renewables and the competitiveness of solar's unsubsidized levelized cost of electricity (LCOE) relative to other sources of generation also impact market demand.

Cost of response to risk

97,000,000

Description of response and explanation of cost calculation

We continue to devote substantial resources to our R&D efforts, which generally focus on continually improving the wattage and energy yield of our solar modules. In 2019, we spent approximately \$97 million on research and development (or 3.2% of our net sales of \$3.1 billion) as stated in our FY19 10K. Our PV solar energy solutions compete favorably on an economic basis with traditional forms of energy generation in multiple markets in the U.S. In addition to investing in research and development, we focus on developing long-lasting partnerships with strategic customers and becoming the partner of choice for utilities, corporate customers, and independent power producers.

Comment

Identifier

Risk 2

Where in the value chain does the risk driver occur?

Upstream

Risk type & Primary climate-related risk driver

Market

Increased cost of raw materials

Primary potential financial impact

Increased direct costs

Company-specific description

First Solar is exposed to price risks for the raw materials, components, services, and energy costs used in the manufacturing and transportation of our solar modules and Balance of System (BoS) parts used in our systems. Also, some of our raw materials and components are sourced from a limited number of suppliers or a single supplier. In certain situations, where we source critical raw materials from a single vendor, we ensure the product can be manufactured in multiple geographies. We endeavor to qualify multiple suppliers using a robust qualification process. In some cases, we also enter into long-term supply contracts for raw materials and components. Accordingly, we are exposed to price changes in the raw materials and components used in our solar modules and systems. For example, the imposition of carbon taxes could lead to increases in the costs of raw materials, such as glass, which have relatively high energy

requirements for production. In addition, the failure of a key supplier could disrupt our supply chain, which could result in higher costs and/or a disruption in our manufacturing or construction processes. We may be unable to pass along changes in the costs of the raw materials and components for our modules and systems to our customers and may be in default of our delivery obligations if we experience a manufacturing or construction disruption.

Time horizon

Long-term

Likelihood

About as likely as not

Magnitude of impact

Medium

Are you able to provide a potential financial impact figure?

Yes, a single figure estimate

Potential financial impact figure (currency)

40,600,000

Potential financial impact figure – minimum (currency)

Potential financial impact figure – maximum (currency)

Explanation of financial impact figure

To estimate the financial implications of a carbon tax, we used the Interagency Working Group on Social Cost of Carbon's central estimate for a ton of CO₂ emitted (\$39). Assuming a carbon price of \$39/ metric ton applied to our 2019 scope 3 emissions for purchased goods and services (1,043,146 metric tons CO₂-eq), the cost of our purchased goods and services could increase by approximately \$40.6 million (medium impact).

Cost of response to risk

0

Description of response and explanation of cost calculation

To mitigate supply chain price risks, we strive to qualify multiple suppliers using a robust qualification process and diversify the geographic diversity of our suppliers. When possible we attempt to use suppliers that can provide a raw material supply source that is near our manufacturing locations, reducing the cost and lead times for such materials. Sourcing raw materials from nearby suppliers also helps to reduce transport- and shipping-related energy use and carbon emissions. We also stock a supply of raw materials onsite in the event of supply disruption at one of our facilities. In addition, First Solar's recycling team developed a high-value recycling process that recovers over 90% of our semiconductor material for reuse in new modules and

approximately 90% of the glass for use in new glass products. First Solar is proactively investing in recycling technology improvements with the ultimate aim of refining the quality of the recovered glass so it may be reused in new solar modules.

The cost of response to this risk is \$0 since supplier qualification and recycling operations are included in our normal operating costs.

Comment

Identifier

Risk 3

Where in the value chain does the risk driver occur?

Direct operations

Risk type & Primary climate-related risk driver

Acute physical

Increased severity and frequency of extreme weather events such as cyclones and floods

Primary potential financial impact

Decreased revenues due to reduced production capacity

Company-specific description

Our solar modules are currently produced at our facilities in Perrysburg, Ohio; Lake Township, Ohio; Kulim, Malaysia; and Ho Chi Minh City, Vietnam. Damage to or disruption of these facilities could interrupt our business and adversely affect our ability to generate net sales. Our asset-level (manufacturing plants) scorecards have identified natural disasters (such as earthquakes, tornadoes, hurricane, building collapse, flood, etc.) as a key risk driver that can impact our manufacturing plant's abilities to operate in Ohio. Any damage to or disruption of our facilities would result in an inability to maintain maximum production levels.

Time horizon

Short-term

Likelihood

Unlikely

Magnitude of impact

High

Are you able to provide a potential financial impact figure?

Yes, an estimated range

Potential financial impact figure (currency)

Potential financial impact figure – minimum (currency)

0

Potential financial impact figure – maximum (currency)

600,000,000

Explanation of financial impact figure

Assuming an average selling price of \$0.324/W, as implied by our June 30, 2020 contracted module backlog of 10.8 GW for an aggregate transaction price of \$3.5 billion, and 2019 exit rate nameplate capacity in Ohio of 1.9 gigawatts (GW)DC, the maximum potential revenue impact if our production in Ohio was down for an entire year would be approximately \$600 million. This worst-case scenario however is unlikely. We would likely lose some production for a while in the event of a natural disaster until we are able to bring the affected buildings back into production.

Cost of response to risk

1,000,000

Description of response and explanation of cost calculation

To mitigate the impacts of a natural disaster on our operations in Ohio, we separate our manufacturing capability across several buildings and purchase insurance to cover such losses. The cost of the response is based on our approximate annual insurance costs for Ohio. We have implemented our management method to reduce and minimize this risk.

Comment

Identifier

Risk 4

Where in the value chain does the risk driver occur?

Upstream

Risk type & Primary climate-related risk driver

Acute physical

Increased severity and frequency of extreme weather events such as cyclones and floods

Primary potential financial impact

Decreased revenues due to reduced production capacity

Company-specific description

Our solar modules are currently produced at our facilities in Perrysburg, Ohio; Lake Township, Ohio; Kulim, Malaysia; and Ho Chi Minh City, Vietnam. Damage to or disruption of these facilities could interrupt our business and adversely affect our ability to generate net sales. Our asset-level (manufacturing plants) scorecards have identified

natural disasters at a supplier's site as a key risk driver for their ability to disrupt supply and shipment channels at our manufacturing facility in Malaysia and Vietnam. Shortages of essential components could occur due to interruptions of supply and could impair our ability to meet customer demand for our products and interrupt our business. This would result in an inability to maintain maximum production levels.

Time horizon

Short-term

Likelihood

Likely

Magnitude of impact

High

Are you able to provide a potential financial impact figure?

Yes, an estimated range

Potential financial impact figure (currency)

Potential financial impact figure – minimum (currency)

0

Potential financial impact figure – maximum (currency)

780,000,000

Explanation of financial impact figure

Interruption of supply to our manufacturing facilities in Malaysia and Vietnam caused by physical climate drivers could significantly affect the company's production levels. Assuming an average selling price of \$0.324/W as implied by our June 30, 2020 contracted module backlog of 10.8 GW for an aggregate transaction price of \$3.5 billion, and 2019 exit rate Series 6 nameplate capacity in Malaysia of 1.2 GW and Vietnam of 2.4 gigawatts (GW)DC, the maximum potential revenue impact if our production in either Malaysia or Vietnam was down for an entire year would be approximately \$390 million and \$780 million respectively. Such a worst case scenario however is unlikely. We would likely lose some production for a while in the event of a natural disaster interrupting our supply.

Cost of response to risk

0

Description of response and explanation of cost calculation

To mitigate supply chain price risks, we strive to qualify multiple suppliers using a robust qualification process. When possible we attempt to use suppliers that can provide a raw material supply source that is near our manufacturing locations, reducing the cost and lead times for such materials. We also stock a supply of raw materials onsite in the event of supply disruption at one of our facilities. The cost of response to this risk is \$0 since supplier qualification is included in our normal operating costs.

Comment

C2.4

(C2.4) Have you identified any climate-related opportunities with the potential to have a substantive financial or strategic impact on your business?

Yes

C2.4a

(C2.4a) Provide details of opportunities identified with the potential to have a substantive financial or strategic impact on your business.

Identifier

Opp1

Where in the value chain does the opportunity occur?

Direct operations

Opportunity type

Products and services

Primary climate-related opportunity driver

Shift in consumer preferences

Primary potential financial impact

Increased revenues resulting from increased demand for products and services

Company-specific description

2019 was a strong year with net bookings of 6.1GW, as well as record shipments of 5.4GW. The bookings momentum has continued in 2020, with 2.6GW of additional net bookings to date. We believe the strong bookings in 2019 are evidence of the demand for renewable energy in general and our Series 6 PV modules in particular as well as our track record of meeting pricing and delivery commitments for long-dated agreements. The wholesale commercial and industrial market also represents a promising opportunity given our utility-scale PV solar power system expertise. The demand for corporate renewables continues to accelerate, with corporations worldwide committing to the RE100 campaign, a collaborative, global initiative of influential businesses committed to 100% renewable electricity. We believe we also have a competitive advantage in the commercial and industrial market due to many customers' sensitivity to the experience, bankability, and financial viability of their suppliers and geographically diverse operating locations. With our strong development expertise, financial strength, and global footprint, we are well positioned to meet these needs.

Time horizon

Short-term

Likelihood

Very likely

Magnitude of impact

High

Are you able to provide a potential financial impact figure?

Yes, a single figure estimate

Potential financial impact figure (currency)

3,100,000,000

Potential financial impact figure – minimum (currency)

Potential financial impact figure – maximum (currency)

Explanation of financial impact figure

Net sales for 2019 increased by 36% to \$3.1 billion compared to \$2.2 billion in 2018. The increase in net sales was primarily attributable to an increase in third-party module sales and the sale of solar projects. With over 1GW of corporate power purchase agreements (PPAs) signed, First Solar is an industry leader in corporate solar. Its track record includes projects to support the decarbonization efforts of RE100 members such as Apple, Facebook, Kellogg's, and Microsoft. For example, our 150 MWAC Sun Streams 2 project is expected to provide energy for certain Microsoft Corporation data centers, and our recently sold 227 MWAC Muscle Shoals, 122 MWAC Cove Mountain Solar 2, and 58 MWAC Cove Mountain Solar 1 projects are expected to provide energy for certain Facebook, Inc. data centers through PPAs with Tennessee Valley Authority and PacifiCorp. In June 2020, First Solar signed a 15-year power purchase agreement (PPA) with chemical company Dow for its Gulf Coast operations.

Cost to realize opportunity

2,500,000,000

Strategy to realize opportunity and explanation of cost calculation

We continually evaluate forecasted global demand, competition, and our addressable market and seek to effectively balance manufacturing capacity with market demand and the nature and extent of our competition. During 2019, we commenced commercial production of Series 6 modules at our second manufacturing facility in Ho Chi Minh City, Vietnam and our manufacturing facility in Lake Township, Ohio, a short distance from our plant in Perrysburg, Ohio. Our total cost of sales for our modules and systems business amounted to approximately \$2.5 billion. Our modules business cost of sales includes the cost of raw materials and components for manufacturing solar modules, direct labor for the manufacturing of solar modules and manufacturing overhead, depreciation of manufacturing plant and equipment, facility-related expenses, environmental health and safety costs, and costs associated with shipping, warranties, and solar module collection and recycling (excluding accretion). For our systems

business, project-related costs include development costs (legal, consulting, transmission upgrade, interconnection, permitting, and other similar costs), EPC costs (consisting primarily of solar modules, inverters, electrical and mounting hardware, project management and engineering, and construction labor), and site specific costs.

Comment

Identifier

Opp2

Where in the value chain does the opportunity occur?

Direct operations

Opportunity type

Products and services

Primary climate-related opportunity driver

Development and/or expansion of low emission goods and services

Primary potential financial impact

Increased revenues resulting from increased demand for products and services

Company-specific description

In Europe, renewable energy targets, in conjunction with tenders for utility-scale PV solar and other support measures, have contributed to growth in PV solar markets. Renewable energy targets prescribe how much energy consumption must come from renewable sources, while incentive policies and competitive tender policies are intended to support new supply development by providing certainty to investors. Various European Union ("EU") directives on renewable energy have set targets for all EU member states in support of the current goal of a 32% share of energy from renewable sources in the EU by 2030. Our lower-carbon solar technology not only has positive environmental benefits, but also provides a competitive advantage in commercial discussions. Solar PV tenders in France require an official carbon footprint assessment of solar modules to be eligible for participating in government auctions. After module price, carbon footprint is the most important criteria. As a result of our resource-efficient thin film PV manufacturing process, the carbon footprint of our solar modules is up to six times lower than conventional crystalline silicon modules and a fraction of the carbon footprint of conventional energy sources. In 2019, France represented our third largest market after the U.S. and Australia.

Time horizon

Short-term

Likelihood

Very likely

Magnitude of impact

High

Are you able to provide a potential financial impact figure?

Yes, a single figure estimate

Potential financial impact figure (currency)

88,800,000

Potential financial impact figure – minimum (currency)

Potential financial impact figure – maximum (currency)

Explanation of financial impact figure

In 2019, France accounted for approximately 3% of our net sales or \$88.8 million. Since 2013, our solar modules' carbon footprint advantage resulted in more than \$200 million in sales. Due to our resource-efficient manufacturing process, First Solar modules have a carbon footprint that is up to 6 times lower, a water footprint that is up to 24 times lower and an energy payback time that is up to 4 times faster than conventional crystalline silicon solar panels on a life cycle basis.

Cost to realize opportunity

2,000,000

Strategy to realize opportunity and explanation of cost calculation

We continue to pursue module sales activities in France, which is running tenders where utility-scale PV solar projects can bid for capacity. Cost to realize the opportunity are associated with our government affairs and business development activities which are part of our global Sales, General and Administration costs which amounted to \$205 million in 2019. Since the MENA region represented ~1% of our global workforce in 2019, we estimate the cost to realize this opportunity to be approximately \$2 million. One of our key points of differentiation is our sustainability advantage which further improves with our Series 6 technology. As a result of our specialized manufacturing process, the carbon footprint of our modules is up to six times lower than conventional crystalline silicon modules and a fraction of the carbon footprint of conventional energy sources. On a lifecycle basis, our thin film module technology inherently has the smallest carbon footprint, fastest energy payback time, and lowest water use of any PV solar technology on the market.

Comment

Identifier

Opp3

Where in the value chain does the opportunity occur?

Direct operations

Opportunity type

Products and services

Primary climate-related opportunity driver

Shift in consumer preferences

Primary potential financial impact

Increased revenues resulting from increased demand for products and services

Company-specific description

In addressing the overall global demand for electricity, our advanced thin film modules, which leverage our Series 6 module technology, and power plant solutions compete favorably on an economic basis with traditional forms of electricity generation and provide low cost electricity to end users. Through manufacturing, technology, product quality, and cost excellence, we continue to position ourselves as a leader in the global solar industry. Since announcing the acceleration of Series 6 in 2016, we are realizing the potential of our advanced thin film PV modules. We believe that our differentiated technology, manufacturing process, and financial strength, will enable us to succeed in the PV industry. Our Series 6 module technology, with its combination of high wattage, low manufacturing costs, a larger form factor, and balance of systems (“BoS”) component compatibility, has further enhanced our competitive position since we commenced commercial production of Series 6 in April 2018. We are focusing our resources in those markets and energy applications in which solar power can be a least-cost, best-fit energy solution, particularly in regions with significant current or projected electricity demand, relatively high existing electricity prices, strong demand for renewable energy generation, and high solar resources. During 2019, the majority of our solar modules were sold to integrators and operators of systems in the United States and France.

Time horizon

Short-term

Likelihood

Virtually certain

Magnitude of impact

High

Are you able to provide a potential financial impact figure?

Yes, a single figure estimate

Potential financial impact figure (currency)

1,500,000,000

Potential financial impact figure – minimum (currency)

Potential financial impact figure – maximum (currency)

Explanation of financial impact figure

Net sales from our solar modules segment amounted to approximately \$1.5 billion in 2019, which represented a \$958.1 million increase compared to \$502 million in 2018, primarily due to a 180% increase in the volume of watts sold and a 4% increase in the average selling price per watt. At our core, we are a technology and module manufacturing company. Over time we have added to this core competency in order to address unmet needs within the market, optimize around and enable the delivery of our product, and capture an incremental profit pool. These capabilities have included, among others, project development, EPC, and O&M. As we look across the next decade, we are challenging our business strategy to assess if each product offering continues to allow us to leverage points of differentiation, while creating value for our customers and an attractive profit pool. These factors ultimately led to the decision to transition to a third-party EPC execution model in September 2019.

Cost to realize opportunity

1,200,000,000

Strategy to realize opportunity and explanation of cost calculation

The cost of sales of our modules segment amounted to approximately \$1.2 billion as stated in our annual report. In 2019, our modules segment costs of sales increased by \$617.6 million, compared to \$552 million in 2018, primarily due to an increase in the volume of modules sold. Our modules business cost of sales includes the cost of raw materials and components for manufacturing solar modules, such as glass, transparent conductive coatings, CdTe and other thin film semiconductors, laminate materials, connector assemblies, edge seal materials, and frames. In addition, our cost of sales includes direct labor for the manufacturing of solar modules and manufacturing overhead, such as engineering, equipment maintenance, quality and production control, and information technology. Our cost of sales also includes depreciation of manufacturing plant and equipment, facility-related expenses, environmental health and safety costs, and costs associated with shipping, warranties, and solar module collection and recycling (excluding accretion). We have dedicated, and intend to continue to dedicate, significant capital and human resources to reduce the total installed cost of PV solar energy and to ensure that our solutions integrate well into the overall electricity ecosystem of each specific market. We continually evaluate forecasted global demand, competition, and our addressable market and seek to effectively balance manufacturing capacity with market demand and the nature and extent of our competition. During 2019, we commenced commercial production of Series 6 modules at our second manufacturing facility in Ho Chi Minh City, Vietnam and our manufacturing facility in Lake Township, Ohio, a short distance from our plant in Perrysburg, Ohio. We produced 5.7 GW DC of Series 4 and Series 6 modules during 2019, which represented a 111% increase from 2018. We expect to produce approximately 5.7 GW DC of solar modules during 2020, substantially all of which will be Series 6 modules.

Comment

Identifier

Opp4

Where in the value chain does the opportunity occur?

Direct operations

Opportunity type

Products and services

Primary climate-related opportunity driver

Shift in consumer preferences

Primary potential financial impact

Increased revenues resulting from increased demand for products and services

Company-specific description

Multiple markets within the United States, which accounted for 87% of our 2019 net sales, exemplify favorable characteristics for a solar market, including (i) sizeable electricity demand, particularly around growing population centers and industrial areas; (ii) strong demand for renewable energy generation; and (iii) abundant solar resources. In those areas and applications in which these factors are more pronounced, our PV solar energy solutions compete favorably on an economic basis with traditional forms of energy generation. Tax incentive programs exist in the United States at both the federal and state level and can take the form of investment and production tax credits, accelerated depreciation, and sales and property tax exemptions and abatements. The majority of states in the United States have also enacted legislation adopting Renewable Portfolio Standard (“RPS”) mechanisms. Under an RPS, regulated utilities and other load serving entities are required to procure a specified percentage of their total retail electricity sales to end-user customers from eligible renewable resources, such as solar energy generation facilities, by a specified date. Measured in terms of the volume of renewable electricity required to meet its RPS mandate, California’s RPS program is one of the most significant in the United States. In addition to serving as a template for other states, the California market for renewable energy has historically been a key region for First Solar and has led the western United States in renewable energy demand for the past several years. Pursuant to the passage of SB100 by the California legislature in 2018, the California RPS program now requires utilities and other obligated load serving entities to procure 60% of their total retail electricity demand from eligible renewable resources by 2030. We have significant experience and a market leadership position in developing and operating utility-scale power plants in the United States, particularly in California, other western states, and southeastern states.

Time horizon

Short-term

Likelihood

Very likely

Magnitude of impact

High

Are you able to provide a potential financial impact figure?

Yes, a single figure estimate

Potential financial impact figure (currency)

1,600,000,000

Potential financial impact figure – minimum (currency)

Potential financial impact figure – maximum (currency)

Explanation of financial impact figure

During 2019, system sales accounted for approximately \$1.6 billion (or 52% of our net sales) as stated in our annual report. The majority of our systems business net sales were in the United States.

Cost to realize opportunity

1,300,000,000

Strategy to realize opportunity and explanation of cost calculation

Our systems business cost of sales amounted to more than \$1.3 billion in 2019 as stated in our annual report. For our systems business, project-related costs include development costs (legal, consulting, transmission upgrade, interconnection, permitting, and other similar costs), EPC costs (consisting primarily of solar modules, inverters, electrical and mounting hardware, project management and engineering, and construction labor), and site specific costs. Currently, our solar projects in the United States represent the majority of the advanced-stage pipeline of projects that we are actively developing or constructing. We have significant experience and a market leadership position in developing and operating utility-scale power plants in the United States, particularly in California, other western states, and southeastern states.

Comment

C3. Business Strategy

C3.1

(C3.1) Have climate-related risks and opportunities influenced your organization's strategy and/or financial planning?

Yes, and we have developed a low-carbon transition plan

C3.1a

(C3.1a) Does your organization use climate-related scenario analysis to inform its strategy?

Yes, quantitative

C3.1b

(C3.1b) Provide details of your organization’s use of climate-related scenario analysis.

Climate-related scenarios and models applied	Details
2DS RCP 2.6	<p>We used forward-looking scenario analyses such as the 2°C scenario, when considering the company’s new greenhouse gas emissions target. In assessing the feasibility of science-based targets, we used the CSO Carbon Metric with RCP2.6 - a 2°C GHG mitigation scenario developed under IPCC. Inputs include historical Scope 1 and 2 GHG emissions, gross margins, and total units of production. The scenario was considered over a medium-term time horizon of 5 years, consistent with our business planning horizon. However the CSO Carbon Metric method provides forecasts through 2050. Areas of the organization considered as part of the scenario analysis include Scope 1 and 2 emissions sources (manufacturing and R&D facilities, owned and operational PV projects, owned EPC equipment, vehicle fleet, purchased electricity). The results of the scenario analysis determined that a science-based target would involve reducing corporate Scope 1 and 2 CO₂-emissions intensity by 80% (from 246 to 47 MT CO₂ eq per MW) from a 2008 baseline. Achieving this goal would require implementing a strategy of increasing module efficiency, reducing energy consumption and procuring offsite solar electricity. In 2020, we joined RE100 and committed to going 100% renewable across our global operations by 2028. The RE100 target of achieving 100% renewable operations would reduce our GHG emissions intensity to 5 metric tons CO₂-eq/MW or well below a 2 degree Celsius scenario. We consider this to be a science-based target based on the SBTi’s guidelines which accept renewable energy targets as an alternative if they are in line with procuring 80% of electricity from renewable sources by 2025 and 100% by 2030.</p>

C3.1d

(C3.1d) Describe where and how climate-related risks and opportunities have influenced your strategy.

Have climate-related risks and opportunities influenced your strategy in this area?	Description of influence

Products and services	Yes	As a leading global provider of comprehensive PV solar energy solutions, First Solar derives 100% of its revenues from clean energy products. The adoption of environmental performance criteria in tender schemes, such as the French carbon footprint criteria, is creating a market pull for more sustainable PV products. By increasing the efficiency of our modules and manufacturing process, we have successfully reduced our product carbon footprint which directly translates into business opportunities in France as well as with commercial and industrial customers.
Supply chain and/or value chain	Yes	Climate-related risks such as natural disasters that disrupt the utility and raw material supply to our manufacturing facilities, as identified in our facility scorecards, influence our supply chain management strategy. Supply chain risk management examples include supplier diversification, critical raw material inventory, and strategic sourcing agreements. For example, we entered into long-term supply agreements for the purchase of certain specified minimum volumes of substrate glass and cover glass for our PV solar modules.
Investment in R&D	Yes	Our R&D model differentiates us from much of our competition due to its vertical integration, from advanced research to product development, manufacturing, and applications. We continue to devote substantial resources to continually improving the wattage and energy yield of our solar modules. Improvements in PV solar module efficiency drive reductions in the costs of PV solar thereby expanding PV markets and displacing electricity generated by fossil fuels. We also focus our R&D activities on continuously improving module durability and manufacturing efficiencies, including throughput improvement, volume ramp, and material cost reduction. Based on publicly available information, we are one of the leaders in R&D investment among PV solar module manufacturers, maintaining a rate of innovation that enables rapid wattage gains and cost reductions.
Operations	Yes	Climate-related risks e.g. natural disasters that affect our manufacturing operations are assessed through semi-annual scorecards for our manufacturing sites. We mitigate such risks by distributing our manufacturing capability across several sites. Stable access to electricity and water, are also taken into account when siting new manufacturing facilities. First Solar implements energy efficiency and low carbon initiatives as part of our standard manufacturing system design. We have installed onsite PV installations at

		<p>our production sites in Ohio and Malaysia and at our recycling facility in Frankfurt Oder, Germany. In 2020, we joined RE100 and committed to powering our global operations with 100% renewable energy by 2028. By relying on long-term, fixed-price renewable energy, we're not only investing in reducing our exposure to energy price volatility, but we're also investing in a sustainable energy future.</p>
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C3.1e

(C3.1e) Describe where and how climate-related risks and opportunities have influenced your financial planning.

	Financial planning elements that have been influenced	Description of influence
Row 1	Revenues Capital expenditures	<p>Both climate change risks and opportunities have influenced our financial planning. We are focused on minimizing risks for our factory locations and supply chain as it relates to the dollars that we are putting to work in manufacturing capex. As climate risks worsen, this increases awareness on the speed in which climate initiatives need to be implemented and in turn increases the overall demand for solar. The growing demand for renewable energy and our products directly influences our revenues. Net sales for 2019 increased by 36% to \$3.1 billion compared to \$2.2 billion in 2018. The increase in net sales was primarily attributable to an increase in third-party module sales and the sale of solar projects. We continue to see strong demand from corporate customers who are becoming increasingly proactive in reducing their carbon footprints. Since our first corporate related PPA with Apple Inc., we have contracted over 800 MWAC of PPAs associated with corporate customers to support their renewable energy goals. For example, our 150 MWAC Sun Streams 2 project is expected to provide energy for certain Microsoft Corporation data centers, and our recently sold 227 MWAC Muscle Shoals, 122 MWAC Cove Mountain Solar 2, and 58 MWAC Cove Mountain Solar 1 projects are expected to provide energy for certain Facebook, Inc. data centers through PPAs with Tennessee Valley Authority and PacifiCorp. In July 2020, we were awarded two PPAs for projects located in Ohio and North Carolina that support the clean energy needs of a Fortune 500 company starting in 2023. We remain effectively sold out through 2020 and have a path to fully contract our 2021 supply plan over the next few quarters.</p>

C3.1f

(C3.1f) Provide any additional information on how climate-related risks and opportunities have influenced your strategy and financial planning (optional).

In 2019, we participated in the stakeholder discussions with the European Commission on a sustainable finance taxonomy, specifying criteria for the characterization of sustainable investments into solar PV manufacturing and solar PV assets. As those discussions continue and the taxonomy gets referenced in horizontal legislation on green claims, opportunities for further differentiation may arise for our lower carbon technology.

In 2020, we joined RE100 and committed to powering our global operations with 100% renewable energy by 2028. By relying on long-term, fixed-price renewable energy, we're not only investing in reducing our exposure to energy price volatility, but we're also investing in a sustainable energy future. The RE100 target of achieving 100% renewable operations would reduce our GHG emissions intensity to 5 metric tons CO₂-eq/MW or well below a 2 degree Celsius scenario.

C4. Targets and performance

C4.1

(C4.1) Did you have an emissions target that was active in the reporting year?

Intensity target

C4.1b

(C4.1b) Provide details of your emissions intensity target(s) and progress made against those target(s).

Target reference number

Int 1

Year target was set

2011

Target coverage

Company-wide

Scope(s) (or Scope 3 category)

Scope 1+2 (market-based)

Intensity metric

Other, please specify

Metric Tons CO₂e per megawatt (MW) produced

Base year

2008

Intensity figure in base year (metric tons CO₂e per unit of activity)

246

% of total base year emissions in selected Scope(s) (or Scope 3 category) covered by this intensity figure

100

Target year

2021

Targeted reduction from base year (%)

45

Intensity figure in target year (metric tons CO₂e per unit of activity) [auto-calculated]

135.3

% change anticipated in absolute Scope 1+2 emissions

652

% change anticipated in absolute Scope 3 emissions

Intensity figure in reporting year (metric tons CO₂e per unit of activity)

83

% of target achieved [auto-calculated]

147.2448057814

Target status in reporting year

Achieved

Is this a science-based target?

No, but we anticipate setting one in the next 2 years

Please explain (including target coverage)

After successfully achieving the company's first GHG emissions intensity reduction target. First Solar set a new five-year goal for 2021 to reduce our greenhouse gas emissions intensity per watt produced by 45 percent compared to our 2008 baseline. While we have already achieved our new five-year goal for 2021, we are continuing our retooling and ramping activities, such that maintaining our progress through 2021 will be an important achievement. In 2020, we joined RE100 and committed to going 100% renewable across our global operations by 2028. We consider this to be a science-based target based on the SBTi's guidelines which accept renewable energy targets as an alternative if they are in line with procuring 80% of electricity from renewable sources by 2025 and 100% by 2030.

C4.2

(C4.2) Did you have any other climate-related targets that were active in the reporting year?

No other climate-related targets

C4.3

(C4.3) Did you have emissions reduction initiatives that were active within the reporting year? Note that this can include those in the planning and/or implementation phases.

Yes

C4.3a

(C4.3a) Identify the total number of initiatives at each stage of development, and for those in the implementation stages, the estimated CO2e savings.

	Number of initiatives	Total estimated annual CO2e savings in metric tonnes CO2e (only for rows marked *)
Under investigation	3	
To be implemented*	0	0
Implementation commenced*	0	0
Implemented*	4	1,205
Not to be implemented	0	

C4.3b

(C4.3b) Provide details on the initiatives implemented in the reporting year in the table below.

Initiative category & Initiative type

Energy efficiency in buildings
Lighting

Estimated annual CO2e savings (metric tonnes CO2e)

170

Scope(s)

Scope 2 (market-based)

Voluntary/Mandatory

Voluntary

Annual monetary savings (unit currency – as specified in C0.4)

56,134

Investment required (unit currency – as specified in C0.4)

33,400

Payback period

<1 year

Estimated lifetime of the initiative

3-5 years

Comment

Office re-lighting

Initiative category & Initiative type

Energy efficiency in buildings

Lighting

Estimated annual CO2e savings (metric tonnes CO2e)

35

Scope(s)

Scope 2 (location-based)

Voluntary/Mandatory

Voluntary

Annual monetary savings (unit currency – as specified in C0.4)

8,028

Investment required (unit currency – as specified in C0.4)

400

Payback period

<1 year

Estimated lifetime of the initiative

3-5 years

Comment

Office light timers

Initiative category & Initiative type

Energy efficiency in buildings

Heating, Ventilation and Air Conditioning (HVAC)

Estimated annual CO2e savings (metric tonnes CO2e)

200

Scope(s)

Scope 2 (location-based)

Voluntary/Mandatory

Voluntary

Annual monetary savings (unit currency – as specified in C0.4)

45,175

Investment required (unit currency – as specified in C0.4)

0

Payback period

<1 year

Estimated lifetime of the initiative

3-5 years

Comment

Warehouse temperature settings

Initiative category & Initiative type

Energy efficiency in buildings

Heating, Ventilation and Air Conditioning (HVAC)

Estimated annual CO2e savings (metric tonnes CO2e)

800

Scope(s)

Scope 2 (location-based)

Voluntary/Mandatory

Voluntary

Annual monetary savings (unit currency – as specified in C0.4)

180,797

Investment required (unit currency – as specified in C0.4)

0

Payback period

<1 year

Estimated lifetime of the initiative

3-5 years

Comment

Production temperature settings

C4.3c

(C4.3c) What methods do you use to drive investment in emissions reduction activities?

Method	Comment
Dedicated budget for low-carbon product R&D	Our product causes the greatest impact on GHG reduction. We have a dedicated Research and Development function whose sole purpose is to enhance the efficiency of our product and lower the cost of making it. These projects get a significant amount of First Solar's overall R&D spending.
Employee engagement	We have engaged employees at the site and global level. We have a global facilities team working on defining priorities, identifying opportunities, and implementing energy conservation projects. This is also done at the site level in our manufacturing and research locations, where we have dedicated local teams. Our facilities teams are also rewarded for achieving our energy savings targets.
Financial optimization calculations	Each project opportunity is evaluated for its payback, and external incentives are considered when calculating payback. Energy saving targets are established to reduce manufacturing costs.
Lower return on investment (ROI) specification	Although we do not have a specific ROI for energy conservation projects, we recognize that energy projects are low risk and this understanding of risk is integrated into our regular capital planning decisions.
Partnering with governments on technology development	We have worked with local utilities to find and implement energy conservation projects. For example, we worked with Silicon Valley Power to identify opportunities to reduce our GHG emissions, energy consumption and energy costs at our Santa Clara office building.

C4.5

(C4.5) Do you classify any of your existing goods and/or services as low-carbon products or do they enable a third party to avoid GHG emissions?

Yes

C4.5a

(C4.5a) Provide details of your products and/or services that you classify as low-carbon products or that enable a third party to avoid GHG emissions.

Level of aggregation

Company-wide

Description of product/Group of products

In addition to manufacturing PV solar modules that generate clean reliable electricity with no air emissions, waste production, and minimal water use, First Solar constructs

PV projects that displace the use of electricity generated by fossil fuels, and provides operations and maintenance products and services to enhance grid stability. Our solar PV solutions are helping displace more than 8 times the emissions we emit through our global operations. In 2019, First Solar produced 5.7GW of PV solar modules and our company-wide scope 1 and scope 2 greenhouse gas emissions amounted to approximately 0.47 million metric tons of CO₂ equivalent. Assuming worldwide average irradiance and grid electricity emissions, we conservatively estimate that our 2019 products are being used to displace approximately 4 million metric tons CO₂e per year for the 25+ year product life. Since First Solar began commercial operations in 2002 and through 2019, we have sold over 25 GW of PV solar modules. Assuming average worldwide irradiance and grid electricity emissions, our products are being used to displace 17 million metric tons of CO₂e per year for their 25+ year product life. This is equivalent to powering 12 million average homes and saving over 45 billion liters of water (18,000+ Olympic swimming pools) per year based on worldwide averages.

Are these low-carbon product(s) or do they enable avoided emissions?

Low-carbon product and avoided emissions

Taxonomy, project or methodology used to classify product(s) as low-carbon or to calculate avoided emissions

Other, please specify

Worldwide average carbon displacement

% revenue from low carbon product(s) in the reporting year

100

Comment

First Solar's eco-efficient PV modules and power plants are displacing more than thirty times the amount of greenhouse gas emissions we emit through our global operations. In 2019, First Solar's company-wide scope 1 and scope 2 greenhouse gas emissions amounted to approximately 0.47 million metric tons of CO₂ equivalent. With over 25GW of modules sold worldwide, First Solar PV solutions are displacing over 17 million metric tons of CO₂ equivalent per year, resulting in a net beneficial carbon impact of over 16 million metrics tons CO₂e per year, assuming average worldwide irradiance and grid electricity emissions. More information on the worldwide average solar carbon displacement methodology is provided in our technical report: P. Sinha and L. Jenkins, 2011, Estimating Carbon Displacement by Solar Deployment, First Solar Technical Report. (Available at: http://www.firstsolar.com/-/media/First-Solar/Sustainability-Documents/Sustainability-Studies/TechnicalReportCarbonDisplacement_02761_NA.ashx?dl=1)

C5. Emissions methodology

C5.1

(C5.1) Provide your base year and base year emissions (Scopes 1 and 2).

Scope 1

Base year start

January 1, 2008

Base year end

December 31, 2008

Base year emissions (metric tons CO2e)

1,020

Comment

Scope 2 (location-based)

Base year start

January 1, 2008

Base year end

December 31, 2008

Base year emissions (metric tons CO2e)

123,046

Comment

Scope 2 (market-based)

Base year start

Base year end

Base year emissions (metric tons CO2e)

Comment

C5.2

(C5.2) Select the name of the standard, protocol, or methodology you have used to collect activity data and calculate emissions.

The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard (Revised Edition)

C6. Emissions data

C6.1

(C6.1) What were your organization's gross global Scope 1 emissions in metric tons CO₂e?

Reporting year

Gross global Scope 1 emissions (metric tons CO₂e)

26,520

Comment

C6.2

(C6.2) Describe your organization's approach to reporting Scope 2 emissions.

Row 1

Scope 2, location-based

We are reporting a Scope 2, location-based figure

Scope 2, market-based

We are reporting a Scope 2, market-based figure

Comment

C6.3

(C6.3) What were your organization's gross global Scope 2 emissions in metric tons CO₂e?

Reporting year

Scope 2, location-based

550,908

Scope 2, market-based (if applicable)

441,692

Comment

C6.4

(C6.4) Are there any sources (e.g. facilities, specific GHGs, activities, geographies, etc.) of Scope 1 and Scope 2 emissions that are within your selected reporting boundary which are not included in your disclosure?

No

C6.5

(C6.5) Account for your organization's gross global Scope 3 emissions, disclosing and explaining any exclusions.

Purchased goods and services

Evaluation status

Relevant, calculated

Metric tonnes CO₂e

1,043,146

Emissions calculation methodology

Based on life cycle assessment of First Solar PV module production (Table III; DOI: 10.1002/pip.1068) and total modules produced in 2019, and subtracting 2019 Scope 1 and 2 emissions

Percentage of emissions calculated using data obtained from suppliers or value chain partners

25

Please explain

Bill of materials for PV module manufacturing from a previous year were the basis for the life cycle assessment combined with modules produced in 2019.

Capital goods

Evaluation status

Relevant, calculated

Metric tonnes CO₂e

474,013

Emissions calculation methodology

Our capital expenditures are disclosed as 'purchases of property, plant, and equipment' in our annual report's consolidated cash flow statement. In alignment with the WRI/WBCSD GHG Protocol, we used the Quantis Scope 3 Evaluator tool to calculate scope 3 emissions associated with capital goods purchased based on spend. The emissions are calculated by multiplying our 2019 capital goods spend by a CO₂ emission factor based on the broad sector of purchase.

Percentage of emissions calculated using data obtained from suppliers or value chain partners

25

Please explain

Capital expenditures on purchases of property, plant, and equipment were the basis for the estimate.

Fuel-and-energy-related activities (not included in Scope 1 or 2)

Evaluation status

Relevant, calculated

Metric tonnes CO₂e

22,085

Emissions calculation methodology

GHG emissions from transmission and distribution losses were estimated from market-based Scope 2 GHG emissions from purchased electricity (presented earlier) in conjunction with a transmission and distribution loss factor of 5%.

Percentage of emissions calculated using data obtained from suppliers or value chain partners

25

Please explain

Quantities of purchased electricity were the basis for the estimate.

Upstream transportation and distribution

Evaluation status

Relevant, calculated

Metric tonnes CO₂e

9,151

Emissions calculation methodology

Glass supply distances to First Solar's largest manufacturing facility (Kulim, Malaysia; Table S1 of DOI:10.1109/JPHOTOV.2018.2802786) used in conjunction with transoceanic freight ship fuel consumption factor of 0.0025 kg heavy fuel oil per tonne-km and a residual fuel oil emission factor from WRI GHG Protocol stationary combustion tool (V. 4.1).

Percentage of emissions calculated using data obtained from suppliers or value chain partners

25

Please explain

GHG Emissions were extrapolated from glass supply distances and transport methods from a previous year combined with data on modules produced in 2019.

Waste generated in operations

Evaluation status

Relevant, calculated

Metric tonnes CO₂e

6,790

Emissions calculation methodology

In 2019, we disposed of 14 million kilograms of waste (or 15,432 Tons). Quantity of disposed waste from manufacturing facilities was used in conjunction with U.S. EPA mixed waste landfilling emission factor of 0.12 Metric Ton Carbon Equivalent /Ton. The mass conversion factor of mass carbon to mass CO₂ generated during combustion processes is 44/12

Percentage of emissions calculated using data obtained from suppliers or value chain partners

100

Please explain

Quantities of disposed non-hazardous and hazardous waste were the basis for the estimate. In 2019, we disposed of 14 million kilograms of waste (or 15,432 Tons). Note that approximately 21.62 million kilograms of waste (or 61% of the 35.62 million kilograms of total waste generated) were recycled in 2019.

Business travel

Evaluation status

Relevant, calculated

Metric tonnes CO₂e

4,838

Emissions calculation methodology

Short, medium, and long haul passenger air miles recorded by corporate travel agent were used in conjunction with air travel emission factors of 0.53, 0.43, and 0.39 lb CO₂ per passenger mile, respectively.

Percentage of emissions calculated using data obtained from suppliers or value chain partners

100

Please explain

Short, medium, and long haul passenger air miles recorded by corporate travel agent were the basis for the estimate.

Employee commuting

Evaluation status

Relevant, calculated

Metric tonnes CO₂e

17,996

Emissions calculation methodology

Number of full-time equivalent employees in 2019 was the basis for this estimate combined with assumptions regarding average employee commuting GHG emissions from the Quantis Scope 3 evaluator tool.

Percentage of emissions calculated using data obtained from suppliers or value chain partners

25

Please explain

Number of full-time equivalent employees in 2019 was the basis for this estimate

Upstream leased assets

Evaluation status

Relevant, calculated

Metric tonnes CO₂e

1,624

Emissions calculation methodology

Leased vehicle fuel usage was used in conjunction with WRI Transport Tool, V. 2.5 and and IPCC Fourth Assessment Report GWP values.

Percentage of emissions calculated using data obtained from suppliers or value chain partners

50

Please explain

Leased vehicle fuel usage was based on 2019 quantity of leased vehicles and average fuel usage per vehicle data from a prior year.

Downstream transportation and distribution

Evaluation status

Relevant, calculated

Metric tonnes CO₂e

61,700

Emissions calculation methodology

Finished product (PV module) transport distances and transport methods (ship) from our largest manufacturing facility (Kulim, Malaysia) to our largest market (U.S.; Long Beach, CA used as representative port) were used in conjunction with a transoceanic freight ship fuel consumption factor of 0.0025 kg heavy fuel oil per tonne-km and a residual fuel oil emission factor from WRI GHG Protocol stationary combustion tool (V. 4.1).

Percentage of emissions calculated using data obtained from suppliers or value chain partners

25

Please explain

GHG Emissions were estimated from quantity of PV modules produced in 2019 in conjunction with port to port distance.

Processing of sold products

Evaluation status

Not relevant, explanation provided

Please explain

Our products are not further processed. In less than 3.5 hours, First Solar's fully integrated manufacturing process transforms a sheet of glass into a completed thin film solar PV module, which is flash tested, boxed, and ready for shipment. All processes from the beginning of our manufacturing process to completed module are covered in our scope 1 and 2 emissions

Use of sold products

Evaluation status

Relevant, calculated

Metric tonnes CO₂e

0

Emissions calculation methodology

Our products (PV modules) are electricity producing rather than energy consuming products.

Percentage of emissions calculated using data obtained from suppliers or value chain partners

100

Please explain

Our products are classified as zero-emission electricity generation technologies. First Solar PV solar modules generate clean reliable electricity with no air emissions, waste production, and minimal water use. In 2019, First Solar produced 5.7 GWdc of PV solar modules. Assuming world-wide average irradiance and grid electricity emissions, we estimate that our 2019 products are being used to displace 4 million metric tons CO₂e per year for the 25+ year product life.

End of life treatment of sold products

Evaluation status

Relevant, calculated

Metric tonnes CO₂e

939

Emissions calculation methodology

Electricity consumption per square meter of PV module recycled (DOI: 10.4229/27thEUPVSEC2012-6CV.4.9) was used in conjunction with quantities of end of life PV modules recycled at First Solar's recycling facilities in U.S., Germany, and Malaysia and market-specific GHG electricity emission factors.

Percentage of emissions calculated using data obtained from suppliers or value chain partners

25

Please explain

GHG emissions were estimated from quantity of end of life PV modules recycled in 2019 in conjunction with an electricity consumption factor from a previous year. First Solar, as part of its commitment to extended producer responsibility, has voluntarily established and implemented the industry's first global module recycling program. Note that since these recycling facilities are owned and operated by First Solar, their greenhouse gas emissions are already accounted for within Scope 1 and 2.

Downstream leased assets

Evaluation status

Relevant, calculated

Metric tonnes CO₂e

463

Emissions calculation methodology

Electricity consumption per square foot for warehouse facilities from EIA CBECS database was used in conjunction with square footage from leased warehouse facilities and WRI GHG Protocol tool for purchased electricity (V. 4.7).

Percentage of emissions calculated using data obtained from suppliers or value chain partners

25

Please explain

GHG emissions were estimated based on square footage of leased warehouse facilities.

Franchises

Evaluation status

Not relevant, explanation provided

Please explain

We do not have franchises therefore this is not relevant and there are no scope 3 emissions to report.

Investments

Evaluation status

Relevant, calculated

Metric tonnes CO2e

34,939

Emissions calculation methodology

GHG Emissions from projects in the construction phase were estimated from First Solar Topaz Solar Farm Environmental Impact Report, Appendix 8A, Table 4-10 (which uses URBEMIS vehicle emission factors and IPCC Second Assessment Report GWP values), scaled to 2019 EPC solar deployment of 1178 MW (dc).

Percentage of emissions calculated using data obtained from suppliers or value chain partners

25

Please explain

GHG Emissions were extrapolated from First Solar Topaz Solar Farm Environmental Impact Report based on 2018 EPC solar deployment data.

Other (upstream)

Evaluation status

Not relevant, explanation provided

Please explain

There are no other relevant Scope 3 GHG emissions from upstream sources

Other (downstream)

Evaluation status

Not relevant, explanation provided

Please explain

There are no other relevant Scope 3 GHG emissions from downstream sources

C-CG6.6

(C-CG6.6) Does your organization assess the life cycle emissions of any of its products or services?

	Assessment of life cycle emissions	Comment
Row 1	Yes	

C-CG6.6a

(C-CG6.6a) Provide details of how your organization assesses the life cycle emissions of its products or services.

	Products/services assessed	Life cycle stage(s) most commonly covered	Methodologies/standards/tools applied	Comment
Row 1	All existing and new products/services	Cradle-to-grave	EU Product Environmental Footprint (EUPEF) French Product Environmental Footprint ISO 14040 & 14044	

C6.7

(C6.7) Are carbon dioxide emissions from biogenic carbon relevant to your organization?

No

C6.10

(C6.10) Describe your gross global combined Scope 1 and 2 emissions for the reporting year in metric tons CO₂e per unit currency total revenue and provide any additional intensity metrics that are appropriate to your business operations.

Intensity figure

0.000153

Metric numerator (Gross global combined Scope 1 and 2 emissions, metric tons CO₂e)

468,212

Metric denominator

unit total revenue

Metric denominator: Unit total

3,063,117,000

Scope 2 figure used

Market-based

% change from previous year

4

Direction of change

Decreased

Reason for change

In 2019, our absolute Scope 1 and 2 GHG emissions (468,212 MT CO₂e) increased by 31% relative to 2018 (356,288 MT CO₂e) due to increased production volumes. Total

revenue increased by a slightly higher rate of 36% in 2019 (\$3.063 billion) compared to 2018 (\$2.244 billion).

Intensity figure

71

Metric numerator (Gross global combined Scope 1 and 2 emissions, metric tons CO₂e)

468,212

Metric denominator

full time equivalent (FTE) employee

Metric denominator: Unit total

6,600

Scope 2 figure used

Market-based

% change from previous year

28

Direction of change

Increased

Reason for change

In 2019, our absolute Scope 1 and 2 GHG emissions (468,212 MT CO₂e) increased by 31% relative to 2018 (356,288 MT CO₂e) due to increased production volumes. FTE only increased by 3% from 6433 in 2018 to 6600 in 2019.

Intensity figure

83

Metric numerator (Gross global combined Scope 1 and 2 emissions, metric tons CO₂e)

468,212

Metric denominator

Other, please specify
MW of PV modules produced

Metric denominator: Unit total

5,662

Scope 2 figure used

Market-based

% change from previous year

37

Direction of change

Decreased

Reason for change

In 2019, our absolute Scope 1 and 2 GHG emissions (468,212 MT CO2e) increased by 31% relative to 2018 (356,288 MT CO2e) due to increased production volumes., though not directly proportional to production volume which increased 109% from 2706 MW in 2018 to 5662 MW in 2019.

C7. Emissions breakdowns

C7.1

(C7.1) Does your organization break down its Scope 1 emissions by greenhouse gas type?

Yes

C7.1a

(C7.1a) Break down your total gross global Scope 1 emissions by greenhouse gas type and provide the source of each used greenhouse warming potential (GWP).

Greenhouse gas	Scope 1 emissions (metric tons of CO2e)	GWP Reference
CO2	21,205	IPCC Fifth Assessment Report (AR5 – 100 year)
CH4	20	IPCC Fifth Assessment Report (AR5 – 100 year)
N2O	38	IPCC Fifth Assessment Report (AR5 – 100 year)
HFCs	5,257	IPCC Fourth Assessment Report (AR4 - 100 year)

C7.2

(C7.2) Break down your total gross global Scope 1 emissions by country/region.

Country/Region	Scope 1 emissions (metric tons CO2e)
Germany	632
Malaysia	5,158
United States of America	20,332
Japan	0

Samoa	0
Chile	0
India	0
Viet Nam	398

C7.3

(C7.3) Indicate which gross global Scope 1 emissions breakdowns you are able to provide.

- By business division
- By facility
- By activity

C7.3a

(C7.3a) Break down your total gross global Scope 1 emissions by business division.

Business division	Scope 1 emissions (metric ton CO2e)
Manufacturing and Recycling	9,917
Research and Development	228
Engineering, Procurement, and Construction	16,208
Vehicle Fleet	167

C7.3b

(C7.3b) Break down your total gross global Scope 1 emissions by business facility.

Facility	Scope 1 emissions (metric tons CO2e)	Latitude	Longitude
Perrysburg, Ohio, USA	3,729	41.557058	-83.552515
Frankfurt-Oder, Germany	632	52.312919	14.481102
Kulim, Malaysia	5,158	5.428624	100.572598
Santa Clara, California, USA	228	37.371053	-121.951931
Engineering, Procurement, and Construction	16,208	39.766959	-86.164956
Vehicle Fleet	167	39.766959	-86.164956
Ho Chi Minh City, Viet Nam	398	10.77653	106.70098

C7.3c

(C7.3c) Break down your total gross global Scope 1 emissions by business activity.

Activity	Scope 1 emissions (metric tons CO2e)
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Stationary Combustion	20,676
Mobile Source Emissions	165
Fugitive Emissions	5,257
Process Emissions	422

C7.5

(C7.5) Break down your total gross global Scope 2 emissions by country/region.

Country/Region	Scope 2, location-based (metric tons CO ₂ e)	Scope 2, market-based (metric tons CO ₂ e)	Purchased and consumed electricity, heat, steam or cooling (MWh)	Purchased and consumed low-carbon electricity, heat, steam or cooling accounted for in Scope 2 market-based approach (MWh)
Chile	1,073	1,073	0	0
Germany	1,080	1,080	0	0
India	729	729	0	0
Japan	266	266	0	0
Malaysia	348,683	280,458	0	0
Samoa	19	19	0	0
United States of America	102,992	62,001	0	0
Viet Nam	96,066	96,066	0	0

C7.6

(C7.6) Indicate which gross global Scope 2 emissions breakdowns you are able to provide.

- By business division
- By facility
- By activity

C7.6a

(C7.6a) Break down your total gross global Scope 2 emissions by business division.

Business division	Scope 2, location-based (metric tons CO ₂ e)	Scope 2, market-based (metric tons CO ₂ e)
Manufacturing and Recycling	546,434	437,218
Research and Development	2,125	2,125

Owned Operational Solar Projects	2,349	2,349
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C7.6b

(C7.6b) Break down your total gross global Scope 2 emissions by business facility.

Facility	Scope 2, location-based (metric tons CO2e)	Scope 2, market-based (metric tons CO2e)
Perrysburg, Ohio, USA	100,605	59,614
Frankfurt-Oder, Germany	1,080	1,080
Kulim, Malaysia	348,683	280,458
Santa Clara, California, USA	1,297	1,297
Mesa, Arizona, USA	828	828
Owned Operational Solar Projects	2,349	2,349
Ho Chi Minh City, Viet Nam	96,066	96,066

C7.6c

(C7.6c) Break down your total gross global Scope 2 emissions by business activity.

Activity	Scope 2, location-based (metric tons CO2e)	Scope 2, market-based (metric tons CO2e)
Purchased Electricity	550,908	441,692

C7.9

(C7.9) How do your gross global emissions (Scope 1 and 2 combined) for the reporting year compare to those of the previous reporting year?

Increased

C7.9a

(C7.9a) Identify the reasons for any change in your gross global emissions (Scope 1 and 2 combined), and for each of them specify how your emissions compare to the previous year.

	Change in emissions (metric tons CO2e)	Direction of change	Emissions value (percentage)	Please explain calculation
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Change in renewable energy consumption	0		0	First Solar's on-site PV installations at its manufacturing and recycling facilities in Kulim, Malaysia (750 kW), Frankfurt-Oder, Germany (2.9 MW), and Perrysburg, Ohio, USA (2.75 MW) continue to generate about 7 GWh/yr of electricity for self-consumption.
Other emissions reduction activities	1,205	Decreased	0.34	First Solar implemented a lighting project at its manufacturing facility in Malaysia, and a lighting and HVAC projects at its manufacturing facility in Vietnam . These measures resulted in savings of 1205 metric tons CO2e from avoided electricity consumption in 2019. Our scope 1 and 2 emissions in the previous year (2018) amounted to 356,288 metric tons CO2e. We arrived at a 0.34% decrease in our gross global emissions through $(1205 / 356,288) * 100 = 0.34\%$
Divestment	0	No change	0	There were no divestments in 2019.
Acquisitions	0	No change	0	There were no acquisitions in 2019.
Mergers	0	No change	0	There were no mergers in 2019.
Change in output	389,204	Increased	109	From 2018 to 2019, First Solar increased its production of PV solar modules by 109% from 2.706GW to 5.662GW. This increased output corresponds to a increase of 389,204 metric tons CO2e of emissions, or 109% of the previous year's emissions through $(389,204 / 356,288) * 100 = 109\%$.
Change in methodology	409	Decreased	0.11	In 2019, First Solar changed the grid electricity emission factor for its Kulim, Malaysia facility from a supplier specific factor of 0.534 kg CO2e/kWh in 2018 to a supplier-specific factor of 0.540 kg CO2e/kWh in 2019. Use of the updated supplier specific factor resulted in an increase of 3,116 metric tons CO2e of emissions compared with using the 2018 factor. Also In 2019, First Solar changed the grid electricity emission factor for its

				Perrysburg, Ohio facility from a supplier specific factor of 0.430 kg CO ₂ e/kWh in 2018 to a supplier-specific factor of 0.403 kg CO ₂ e/kWh in 2019. Use of the updated supplier specific factor resulted in a decrease of 3,525 metric tons CO ₂ e of emissions compared with using the 2018 factor. The updated emissions factors for the two facilities account for a net decrease of 409 metric tons CO ₂ e or 0.11% of the previous year's emissions through $(-409) / 356,288 * 100 = -0.11\%$
Change in boundary	0	No change	0	There were no changes in boundary in 2019.
Change in physical operating conditions	0	No change	0	There no changes in physical operating conditions in 2019.
Unidentified	0	No change	0	There were no unidentified changes in 2019.
Other	275,666	Decreased	77	In 2019, higher Series 6 manufacturing throughput led to a reduction of manufacturing electricity usage, as Series 6 modules require less electricity per m ² of PV module production than Series 4 modules. In 2019, an increased proportion of manufacturing occurred in Vietnam, which has a lower grid carbon intensity than the U.S. and Malaysia. The combination of these changes led to a decrease of 275,666 metric tons CO ₂ e of emissions, or 77% of the previous year's emissions through $(-275,666/356,288)*100=-77\%$

C7.9b

(C7.9b) Are your emissions performance calculations in C7.9 and C7.9a based on a location-based Scope 2 emissions figure or a market-based Scope 2 emissions figure?

Market-based

C-CG7.10

(C-CG7.10) How do your total Scope 3 emissions for the reporting year compare to those of the previous reporting year?

Increased

C-CG7.10a

(C-CG7.10a) For each Scope 3 category calculated in C6.5, specify how your emissions compare to the previous year and identify the reason for any change.

Purchased goods and services

Direction of change

Increased

Primary reason for change

Change in output

Change in emissions in this category (metric tons CO₂e)

654,725

% change in emissions in this category

169

Please explain

Emissions were calculated based on life cycle assessment of First Solar PV module production and total modules produced in 2019, and subtracting 2019 Scope 1 and 2 emissions. Since manufacturing output more than doubled in 2019 compared to 2018 and a greater proportion of Series 6 modules were produced, emissions from purchased goods and services increased proportionally.

Capital goods

Direction of change

Decreased

Primary reason for change

Change in physical operating conditions

Change in emissions in this category (metric tons CO₂e)

50,413

% change in emissions in this category

10

Please explain

Capital expenditures on purchases of property, plant, and equipment were the basis for the estimate. These capital expenditures were 10% lower in 2019 than 2018 as

ramping of Series 6 manufacturing and associated capital expenditures were partially completed.

Fuel and energy-related activities (not included in Scopes 1 or 2)

Direction of change

Increased

Primary reason for change

Change in output

Change in emissions in this category (metric tons CO₂e)

5,380

% change in emissions in this category

32

Please explain

GHG emissions from transmission and distribution losses were estimated from market-based Scope 2 GHG emissions from purchased electricity in conjunction with a transmission and distribution loss factor of 5%. In 2019, Scope 2 GHG emissions increased by 32% relative to 2018 due to increased manufacturing output, with proportional increase in transmission and distribution losses.

Upstream transportation and distribution

Direction of change

Increased

Primary reason for change

Change in output

Change in emissions in this category (metric tons CO₂e)

4,096

% change in emissions in this category

81

Please explain

GHG Emissions were extrapolated from glass supply distances and transport methods from a previous year combined with data on modules produced in 2019. As manufacturing output increased in 2019 relative to 2018 and a greater proportion of Series 6 modules were produced, emissions from upstream transportation and distribution increased proportionally.

Waste generated in operations

Direction of change

Increased

Primary reason for change

Change in output

Change in emissions in this category (metric tons CO₂e)

3,274

% change in emissions in this category

93

Please explain

Quantities of disposed non-hazardous and hazardous waste were the basis for the estimate. Quantity of waste disposal increased in 2019 as manufacturing output increased in 2019 compared to 2018, with proportional increase in emissions from waste generated in operations.

Business travel

Direction of change

Decreased

Primary reason for change

Change in physical operating conditions

Change in emissions in this category (metric tons CO₂e)

557

% change in emissions in this category

10

Please explain

Short, medium, and long haul passenger air miles by First Solar associates as recorded by corporate travel agent were the basis for the estimate. The number of full time equivalent associates was similar in 2019 (6600) and 2018 (6433) and emissions from business travel were also comparable, with a slight reduction in 2019 due to fewer trip miles per associate.

Employee commuting

Direction of change

Increased

Primary reason for change

Change in physical operating conditions

Change in emissions in this category (metric tons CO₂e)

455

% change in emissions in this category

3

Please explain

The number of full-time equivalent employees as of 31 December 2019 (6600) was 3% higher than 2018 (6433), with a proportional increase in emissions from employee commuting.

Upstream leased assets

Direction of change

Decreased

Primary reason for change

Change in physical operating conditions

Change in emissions in this category (metric tons CO2e)

1,169

% change in emissions in this category

42

Please explain

Leased vehicle fuel usage was basis for the estimate, and number of leased vehicles decreased in 2019 compared with 2018, with proportional decrease in emissions from upstream leased assets.

Downstream transportation and distribution

Direction of change

Increased

Primary reason for change

Change in output

Change in emissions in this category (metric tons CO2e)

26,271

% change in emissions in this category

74

Please explain

GHG Emissions were estimated from quantity of PV modules produced in 2019 in conjunction with port to port distance. Since manufacturing output increased in 2019 compared with 2018 and a greater proportion of Series 6 modules were produced, the emissions from downstream transportation and distribution increased proportionally.

Use of sold products

Direction of change

No change

Please explain

Our products are classified as zero-emission electricity generation technologies.

End-of-life treatment of sold products

Direction of change

Increased

Primary reason for change

Change in output

Change in emissions in this category (metric tons CO₂e)

258

% change in emissions in this category

38

Please explain

GHG emissions were estimated from quantity of end of life PV modules recycled in 2019. Since First Solar recycles a combination of end-of-life PV modules and manufacturing scrap, the increase in emissions from recycling may be associated with increasing manufacturing output in 2019 and associated increase in manufacturing scrap in 2019.

Downstream leased assets

Direction of change

No change

Please explain

GHG emissions were estimated based on square footage of leased warehouse facilities, which did not change from 2018 to 2019.

Investments

Direction of change

Increased

Primary reason for change

Change in output

Change in emissions in this category (metric tons CO₂e)

17,262

% change in emissions in this category

98

Please explain

Emissions were based on 2019 EPC solar deployment data, which increased 98% from 596 MW in 2018 to 1178 MW in 2019, with proportional increase in emissions from investments.

C8. Energy

C8.1

(C8.1) What percentage of your total operational spend in the reporting year was on energy?

More than 0% but less than or equal to 5%

C8.2

(C8.2) Select which energy-related activities your organization has undertaken.

	Indicate whether your organization undertook this energy-related activity in the reporting year
Consumption of fuel (excluding feedstocks)	Yes
Consumption of purchased or acquired electricity	Yes
Consumption of purchased or acquired heat	No
Consumption of purchased or acquired steam	No
Consumption of purchased or acquired cooling	No
Generation of electricity, heat, steam, or cooling	Yes

C8.2a

(C8.2a) Report your organization's energy consumption totals (excluding feedstocks) in MWh.

	Heating value	MWh from renewable sources	MWh from non-renewable sources	Total (renewable and non-renewable) MWh
Consumption of fuel (excluding feedstock)	HHV (higher heating value)	0	86,531	86,531
Consumption of purchased or acquired electricity			952,228	952,228

Consumption of self-generated non-fuel renewable energy		7,172		7,172
Total energy consumption		7,172	1,038,759	1,045,931

C8.2b

(C8.2b) Select the applications of your organization’s consumption of fuel.

	Indicate whether your organization undertakes this fuel application
Consumption of fuel for the generation of electricity	Yes
Consumption of fuel for the generation of heat	Yes
Consumption of fuel for the generation of steam	No
Consumption of fuel for the generation of cooling	No
Consumption of fuel for co-generation or tri-generation	No

C8.2c

(C8.2c) State how much fuel in MWh your organization has consumed (excluding feedstocks) by fuel type.

Fuels (excluding feedstocks)

Natural Gas

Heating value

HHV (higher heating value)

Total fuel MWh consumed by the organization

21,973

MWh fuel consumed for self-generation of electricity

0

MWh fuel consumed for self-generation of heat

21,973

Emission factor

1.887

Unit

kg CO2e per m3

Emissions factor source

WRI GHG protocol Stationary Combustion Tool V. 4.1

Comment

Fuels (excluding feedstocks)

Diesel

Heating value

HHV (higher heating value)

Total fuel MWh consumed by the organization

63,942

MWh fuel consumed for self-generation of electricity

193

MWh fuel consumed for self-generation of heat

63,749

Emission factor

2.685

Unit

kg CO2e per liter

Emissions factor source

WRI GHG protocol Stationary Combustion Tool V. 4.1

Comment

Fuels (excluding feedstocks)

Motor Gasoline

Heating value

HHV (higher heating value)

Total fuel MWh consumed by the organization

616

MWh fuel consumed for self-generation of electricity

0

MWh fuel consumed for self-generation of heat

616

Emission factor

8.87

Unit

kg CO2e per gallon

Emissions factor source

WRI GHG protocol Transport Tool V. 2.5.1

Comment

C8.2d

(C8.2d) Provide details on the electricity, heat, steam, and cooling your organization has generated and consumed in the reporting year.

	Total Gross generation (MWh)	Generation that is consumed by the organization (MWh)	Gross generation from renewable sources (MWh)	Generation from renewable sources that is consumed by the organization (MWh)
Electricity	7,172	7,172	7,172	7,172
Heat	0	0	0	0
Steam	0	0	0	0
Cooling	0	0	0	0

C8.2e

(C8.2e) Provide details on the electricity, heat, steam, and/or cooling amounts that were accounted for at a zero emission factor in the market-based Scope 2 figure reported in C6.3.

Sourcing method

None (no purchases of low-carbon electricity, heat, steam or cooling)

Low-carbon technology type

Country/region of consumption of low-carbon electricity, heat, steam or cooling

MWh consumed accounted for at a zero emission factor

Comment

In 2019, First Solar consumed 7172 MWh of self-generated renewable electricity which are not reported here as they were not purchases of low-carbon electricity.

C-CG8.5

(C-CG8.5) Does your organization measure the efficiency of any of its products or services?

	Measurement of product/service efficiency	Comment
Row 1	Yes	While PV modules are electricity generating (not energy-consuming) devices, the module conversion efficiency is a standard measurement of product efficiency.

C-CG8.5a

(C-CG8.5a) Provide details of the metrics used to measure the efficiency of your organization's products or services.

Category of product or service

Solar energy equipment

Product or service (optional)

Photovoltaic module

% of revenue from this product or service in the reporting year

48

Efficiency figure in the reporting year

0.176

Metric numerator

Other, please specify
kilowatt

Metric denominator

square meter

Comment

In 2019, First Solar Series 6 PV modules ranged from 17.0-18.2% module conversion efficiency, corresponding to 0.170-0.182 kilowatt per m2, or 420-450 watt per module, given 2.47 m2 per module.

C9. Additional metrics

C9.1

(C9.1) Provide any additional climate-related metrics relevant to your business.

Description

Waste

Metric value

7.3

Metric numerator

grams

Metric denominator (intensity metric only)

Watt produced

% change from previous year

15

Direction of change

Decreased

Please explain

In 2019, our manufacturing waste intensity decreased by approximately 14% primarily due to increased manufacturing throughput related to our Series 6 production lines.

Description

Energy usage

Metric value

0.16

Metric numerator

kilowatt hours

Metric denominator (intensity metric only)

Watt produced

% change from previous year

36

Direction of change

Decreased

Please explain

In 2019, our manufacturing energy intensity (energy consumption per watt produced) decreased by 36% compared to 2018 primarily due to the increased throughput and efficiency of our Series 6 manufacturing process.

Description

Other, please specify
Water

Metric value

0.68

Metric numerator

Liters

Metric denominator (intensity metric only)

Watt produced

% change from previous year

46

Direction of change

Decreased

Please explain

In 2019, First Solar's manufacturing water intensity decreased by approximately 46% due to the increased throughput and efficiency of our Series 6 manufacturing process as well as water recycling initiatives. 46

C-CE9.6/C-CG9.6/C-CH9.6/C-CN9.6/C-CO9.6/C-EU9.6/C-MM9.6/C-OG9.6/C-RE9.6/C-ST9.6/C-TO9.6/C-TS9.6

(C-CE9.6/C-CG9.6/C-CH9.6/C-CN9.6/C-CO9.6/C-EU9.6/C-MM9.6/C-OG9.6/C-RE9.6/C-ST9.6/C-TO9.6/C-TS9.6) Does your organization invest in research and development (R&D) of low-carbon products or services related to your sector activities?

	Investment in low-carbon R&D	Comment
Row 1	Yes	Our R&D model differentiates us from much of our competition due to its vertical integration, from advanced research to product development, manufacturing, and applications. We continue to devote substantial resources to our R&D efforts, which generally focus on continually improving the wattage and energy yield of our solar modules. We also focus our R&D activities on continuously improving module durability and manufacturing efficiencies, including throughput improvement, volume ramp, and material

		cost reduction. Based on publicly available information, we are one of the leaders in R&D investment among PV solar module manufacturers, maintaining a rate of innovation that enables rapid wattage gains and cost reductions.
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C-CG9.6a

(C-CG9.6a) Provide details of your organization’s investments in low-carbon R&D for capital goods products and services over the last three years.

Technology area

Renewable energy

Stage of development in the reporting year

Large scale commercial deployment

Average % of total R&D investment over the last 3 years

81 - 100%

R&D investment figure in the reporting year (optional)

96,611,000

Comment

Our R&D model differentiates us from much of our competition due to its vertical integration, from advanced research to product development, manufacturing, and applications. We continue to devote substantial resources to our R&D efforts, which generally focus on continually improving the wattage and energy yield of our solar modules. We also focus our R&D activities on continuously improving module durability and manufacturing efficiencies, including throughput improvement, volume ramp, and material cost reduction.

C10. Verification

C10.1

(C10.1) Indicate the verification/assurance status that applies to your reported emissions.

	Verification/assurance status
Scope 1	Third-party verification or assurance process in place
Scope 2 (location-based or market-based)	Third-party verification or assurance process in place
Scope 3	No third-party verification or assurance

C10.1a

(C10.1a) Provide further details of the verification/assurance undertaken for your Scope 1 emissions, and attach the relevant statements.

Verification or assurance cycle in place

Triennial process

Status in the current reporting year

No verification or assurance of current reporting year

Type of verification or assurance

Limited assurance

Attach the statement

 11435 FSI 2018 WRI GHG Statement 2019-06-15 signed (1).pdf

Page/ section reference

Pages 1-3

Relevant standard

ISO14064-3

Proportion of reported emissions verified (%)

100

C10.1b

(C10.1b) Provide further details of the verification/assurance undertaken for your Scope 2 emissions and attach the relevant statements.

Scope 2 approach

Scope 2 market-based

Verification or assurance cycle in place

Triennial process

Status in the current reporting year

No verification or assurance of current reporting year

Type of verification or assurance

Limited assurance

Attach the statement

📎 11435 FSI 2018 WRI GHG Statement 2019-06-15 signed (1).pdf

Page/ section reference

Pages 1-3

Relevant standard

ISO14064-3

Proportion of reported emissions verified (%)

100

C10.2

(C10.2) Do you verify any climate-related information reported in your CDP disclosure other than the emissions figures reported in C6.1, C6.3, and C6.5?

No, we do not verify any other climate-related information reported in our CDP disclosure

C11. Carbon pricing

C11.1

(C11.1) Are any of your operations or activities regulated by a carbon pricing system (i.e. ETS, Cap & Trade or Carbon Tax)?

No, and we do not anticipate being regulated in the next three years

C11.2

(C11.2) Has your organization originated or purchased any project-based carbon credits within the reporting period?

No

C11.3

(C11.3) Does your organization use an internal price on carbon?

No, and we do not currently anticipate doing so in the next two years

C12. Engagement

C12.1

(C12.1) Do you engage with your value chain on climate-related issues?

Yes, our suppliers

Yes, our customers

Yes, other partners in the value chain

C12.1a

(C12.1a) Provide details of your climate-related supplier engagement strategy.

Type of engagement

Compliance & onboarding

Details of engagement

Included climate change in supplier selection / management mechanism

Climate change is integrated into supplier evaluation processes

% of suppliers by number

4

% total procurement spend (direct and indirect)

2

% of supplier-related Scope 3 emissions as reported in C6.5

1

Rationale for the coverage of your engagement

Before any materials are used in our manufacturing process, a supplier must undergo a rigorous qualification process. First Solar evaluates new suppliers using a balanced scorecard which focuses on the areas of Quality, Cost, Flexibility, Service, Technology and Sustainability. First Solar audits new and high-risk direct suppliers for their adherence to quality, environmental, health and safety, among other areas. The EHS section of our supplier audit tool uses the Responsible Business Alliance (RBA) Code of Conduct as a framework and encompasses topics such as environmental management, health and safety, labor and human rights and ethics. Our supplier audit tool also includes questions on energy consumption, GHG emissions goals and targets, as well as other environmental performance objectives. We prioritize our engagement by focusing on our module component suppliers. We assessed 4% of suppliers in 2019, representing approximately 2% of our spend and 1% of our total scope 3 emissions. This was estimated based on 2% of our 2019 Scope 3 Emissions from purchased goods and services (1,043,146 metric tons CO₂-eq) which amounts to 20,863 metric tons CO₂-eq, divided by total 2019 scope 3 emissions (1,677,684) = 1% of total scope 3 emissions.

Impact of engagement, including measures of success

Suppliers are scored in terms of low, medium and high risk to determine whether further engagement or corrective actions are needed. First Solar's Supplier Quality group trends and monitors on a monthly basis the number of non-conformances and drives the supplier to provide permanent corrective actions to prevent any reoccurrence of issues. After completing an onsite assessment, suppliers are more aware of First Solar's environmental, health and safety (EHS) requirements. In the past, results from audits have led suppliers to make improvements such as creating or improving recycling

programs, EHS objectives and targets. In 2019, no suppliers were identified as having potential negative impacts based on their EHS audit score. First Solar works with suppliers to drive supplier improvement in Quality and EHS.

Comment

C12.1b

(C12.1b) Give details of your climate-related engagement strategy with your customers.

Type of engagement

Collaboration & innovation

Details of engagement

Other, please specify

Promote renewable energy adoption and education on lower carbon solar

% of customers by number

100

% of customer - related Scope 3 emissions as reported in C6.5

0

Please explain the rationale for selecting this group of customers and scope of engagement

We work with electric utility customers to meet government mandated renewable portfolio standards through solar PV deployment. We work with commercial/industrial customers to meet carbon mitigation/neutrality goals through solar PV deployment. Since our products (solar PV modules) are energy producing rather than energy consuming products, they represent 0% of our scope 3 emissions.

Impact of engagement, including measures of success

These engagements receive high priority as they are commercial opportunities. Success is measured by the performance of our solar PV projects and the amount of conventional grid electricity that is displaced. In 2019, First Solar produced 5.7 GW of PV solar modules and our company-wide scope 1 and scope 2 greenhouse gas emissions amounted to approximately 0.46 million metric tons of CO₂ equivalent. Assuming worldwide average irradiance and grid electricity emissions, we conservatively estimate that our 2019 products are being used to displace 24 million metric tons CO₂e per year for the 25+ year product life.

C12.1d

(C12.1d) Give details of your climate-related engagement strategy with other partners in the value chain.

Other examples of climate-related engagement include hosting webinars on the life cycle impacts of solar PV and how the industry can reduce its impacts by focusing on hotspots such as electricity usage in the supply chain. We also raise awareness about the energy-water-carbon nexus through our social media platforms to highlight the important role solar PV can play in helping companies decouple their growth from environmental impacts associated with traditional sources of electricity generation. Over the past few years, we participated in a multi-stakeholder process led by the Green Electronics Council and NSF international to develop the industry's first sustainability leadership standard for PV modules and inverters (NSF 457) which includes criteria on energy and water efficiency, GHG emissions, and corporate sustainability reporting. PV modules and inverters conforming to NSF 457 will be added to the EPEAT registry for sustainable electronics. The EPEAT registry will enable public and private purchasers to identify environmentally preferable PV products.

C12.3

(C12.3) Do you engage in activities that could either directly or indirectly influence public policy on climate-related issues through any of the following?

- Direct engagement with policy makers
- Trade associations
- Funding research organizations
- Other

C12.3a

(C12.3a) On what issues have you been engaging directly with policy makers?

Focus of legislation	Corporate position	Details of engagement	Proposed legislative solution
Clean energy generation	Support	First Solar actively supported clean energy generation policies in state legislatures and regulatory proceedings in a large number of states including CA, NV, UT, AZ, NC, SC, VA, OH, MD, GA, FL, IN, NJ. First Solar engages directly by providing comments, testimony, and meeting with legislators, regulators and staff. First Solar also engages indirectly through trade associations.	First Solar has advocated for expanded Renewable Portfolio Standards (RPSs) and clean energy procurement requirements for utilities in states that don't have existing RPS policies. First Solar has also defended existing policies where they are under threat (e.g. HB6 in OH). We supported clean energy generation policies in line with our business objectives of promoting large-scale solar. First Solar's work supported successful legislative efforts in MD (SB516), NV (SB358), NC (H329), TX (HB3143), UT

			(HB411), NM (SB489), CO (SB1261 and SB 236), and SC (H 3659) in 2019 while setting the stage for success in other states in 2020.
Other, please specify Integrated resource planning	Support	First Solar engages directly and indirectly through trade associations with utilities and regulators to improve integrated resource planning for clean energy generation, specifically for utility scale PV. First Solar regularly provides utilities with updated pricing and technology information to ensure that their integrated resource planning processes have the most up to date (often the most competitive) pricing information available.	This is a regulatory matter that directly influences procurement strategy for conventional, vertically integrated utilities and their regulators. First Solar has engaged in IRP proceedings in the following states with the end goal of increasing carbon-free electric generation: CA, NV, AZ, UT, OR, NC, GA, IN.
Clean energy generation 💬 ₁	Support	Active outreach in favor of increased renewable energy targets, and for removing administrative obstacles to the widespread deployment of solar PV installations. Engaged EU and national regulators both directly and through trade association.	First Solar is supportive of the EU's ambition to be climate neutral by 2050. It has shared expertise on the EU Green Deal, and will continue to drive advocacy so the COVID recovery funding is assigned to low carbon infrastructure project and technologies, including the mass deployment of solar PV installations.
Other, please specify European Commission Product Environmental Footprint Pilot Phase	Support	First Solar is leading the Joint Mission Group on Eco-Design and Energy Labeling for PV Modules, Inverters and Systems to develop recommendations on the criteria for Eco-Design and Energy Labeling for these product groups under the European Commission Circular Economy Package initiatives. Building on the experience from the Product Environmental Footprint Pilot Phase, the Joint Mission Group brings together over 40 experts	First Solar supported the development of the Product environmental Footprint category rules for PV without exceptions. The PEF pilot phase results for photovoltaic electricity generation were subsequently introduced in EU policy discussions on potential sustainable product policy instruments (Eco-Design, Eco-Labeling, Energy Labeling) for photovoltaic modules, inverters and systems. The preparatory study on these policy

		<p>from Science, Industry and Society to work on these proposals.</p>	<p>instruments was concluded in 2019 and resulted in a regulatory proposal to develop Eco-Design and Energy Labeling criteria for PV Modules, Inverters and PV systems, which is expected to take place from 2020 through 2024.</p>
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 ¹EU Green Deal and Green Recovery

C12.3b

(C12.3b) Are you on the board of any trade associations or do you provide funding beyond membership?

Yes

C12.3c

(C12.3c) Enter the details of those trade associations that are likely to take a position on climate change legislation.

Trade association

Large-Scale Solar Association (LSA)

Is your position on climate change consistent with theirs?

Consistent

Please explain the trade association's position

LSA works with its member companies to represent the utility-scale solar industry in important policy discussions, furthering support for large-scale solar development. LSA's principal jurisdictional focus is in California, although LSA sometimes engages with respect to legislation and regulatory matters in other western U.S. states. Key policy areas of focus include recognition of the societal value and economic benefits of climate mitigation policies; progressive utility procurement policies; progressive pricing and tax policies; rational and environmentally sound land use policy; and transmission reform and expansion.

How have you influenced, or are you attempting to influence their position?

As a member of LSA's Board, First Solar participates in developing LSA's advocacy positions with respect to legislation and regulatory matters concerning climate change, clean energy policy and related infrastructure issues.

Trade association

American Council on Renewable Energy (ACORE)

Is your position on climate change consistent with theirs?

Consistent

Please explain the trade association's position

ACORE, a 501(c)(3) non-profit membership organization, is dedicated to building a secure and prosperous America with clean, renewable energy. ACORE convenes thought leadership forums and creates energy industry partnerships to communicate the economic, security and environmental benefits of renewable energy. ACORE's policy work focuses on key tax, finance, grid modernization and other issues that are important for renewable energy expansion. ACORE is focused on the accelerated transition to a renewable energy economy to reduce emissions and mitigate risks associated with climate change. ACORE's analysis suggests that the U.S. federal government's prior climate goals for 2025 remain achievable, despite reduced regulation of greenhouse emissions through a 50 percent reduction in power sector emissions. To achieve a 50 percent reduction in power sector greenhouse emissions by 2025, ACORE focuses on strategically promoting the most viable measures that facilitate growth and investment for renewables and enabling technologies, including carbon pricing or other stable long-term policies that incentivize innovation and investment in carbon-free electricity generation.

How have you influenced, or are you attempting to influence their position?

As a board member, First Solar contributes to and supports position papers on tax and energy policies that affect the financing, development, and procurement of renewable energy. First Solar supported and contributed to ACORE's comments on the Proposed Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units. First Solar and ACORE proposed suggestions to give states the tools and incentives necessary to deploy low-cost renewable solutions e.g. state-specific renewable energy goals.

Trade association

Interwest Energy Alliance

Is your position on climate change consistent with theirs?

Consistent

Please explain the trade association's position

The Interwest Energy Alliance is a non-profit trade association that brings the nation's renewable energy industry together with the West's advocacy community in a consensus-based, collaborative approach to market development in the West (AZ, CO, NV, NM, UT & WY). Interwest is a regional partner of the American Wind Energy Association and Advanced Energy Economy, and has played a key role in legislation expanding opportunities for renewable energy resources in the inter-mountain West.

How have you influenced, or are you attempting to influence their position?

As a board member, First Solar participates in and is supportive of the association's overall mission and programs to advance the clean energy agenda.

Trade association

Texas Solar Power Association

Is your position on climate change consistent with theirs?

Consistent

Please explain the trade association's position

TSPA works with its member companies to represent the solar industry in important policy discussions in Texas, furthering solar development at the Legislature, Public Utilities Commission and the Electric Reliability Council of Texas. Key policy areas of focus include recognition of the economic benefits of solar development including reducing greenhouse gas emissions; the need for regulatory certainty, including developing a state based CPP compliance plan; transmission expansion; and leveraging competitive market forces to increase the deployment of solar in the state.

How have you influenced, or are you attempting to influence their position?

As a member of TSPA's Board, First Solar participates in developing TSPA's advocacy positions with respect to legislation and regulatory matters concerning climate change, clean energy policy and related infrastructure issues.

Trade association

Georgia Large Scale Solar Association (GLSSA)

Is your position on climate change consistent with theirs?

Consistent

Please explain the trade association's position

Georgia Large Scale Solar Association (GLSSA), is a non-profit trade association consisting of businesses that promote the economic and environmental benefits of solar energy generation in Georgia. First Solar formed GLSSA along with other solar developers active in Georgia to intervene in Georgia Power's IRP with a goal of expanding utility-scale solar markets in the state. GLSSA promotes low carbon energy generation like utility-scale solar as a means of tackling climate change.

How have you influenced, or are you attempting to influence their position?

As a member of GLSSA's Executive Committee, First Solar participates in developing GLSSA's advocacy positions with respect to legislation and regulatory matters concerning climate change, clean energy policy and related infrastructure issues.

Trade association

Solar Power Europe

Is your position on climate change consistent with theirs?

Consistent

Please explain the trade association's position

SolarPower Europe (formerly known as EPIA or the European Photovoltaic Industry Association) aims to shape the regulatory environment and enhance business opportunities for solar power in Europe. SolarPower Europe supports policies that advance an energy system based on renewable energy and energy efficiency to remain below a 2°C temperature increase.

How have you influenced, or are you attempting to influence their position?

As a board member and Vice-Chair of the Strategy Committee, First Solar contributes to PV industry position papers to promote further renewable energy deployment in Europe through ambitious targets and consistent PV energy policies.

Trade association

International Thin Film Solar Industry Association PVThin a.i.s.b.l.

Is your position on climate change consistent with theirs?

Consistent

Please explain the trade association's position

PVthin is an international, not-for-profit coalition representing global leaders in the thin-film solar industry. Its objective is to strengthen global energy security and support the transition to a low carbon economy by promoting the social, economic and environmental benefits of thin-film solar photovoltaic technologies. The activities of the coalition currently focus on:

- Advocating thin film PV as a solution for energy security, climate change and water scarcity
- Promoting policies that reward sustainable business practices such as resource efficiency and advanced closed-loop recycling schemes
- Sharing and promoting best practices in environment, health and safety management
- Advancing a recycling standard for PV modules under the EU WEEE Directive
- Participating in the development of the European Commission's Product Environmental Footprint Category Rules for PV electricity generation
- Supporting the development of regulatory measures in the context of Eco-Design and Energy Labelling

Advocacy on raw materials and resource policy discussions.

How have you influenced, or are you attempting to influence their position?

As Board Member and President of the Association, First Solar supports and drives the engagement of the Association in relevant policy discussions related to solar energy.

Trade association

Climate Leadership Council

Is your position on climate change consistent with theirs?

Consistent

Please explain the trade association's position

The Climate Leadership Council promotes a carbon dividends framework as the most cost-effective, equitable and politically-viable climate solution. The plan calls for a substantial, gradually rising, revenue-neutral carbon tax with the revenue distributed to citizens.

How have you influenced, or are you attempting to influence their position?

As a founding member, First Solar supports the Climate Leadership Council's mission and carbon dividends plan. "First Solar is uniquely positioned as a leader in the world's sustainable energy future. Our commitment to enabling national energy grids, corporate procurement groups and local communities worldwide to incorporate clean, renewable energy is squarely aligned with the Climate Leadership Council's mission. We see this effort as a crucial forum for informed advocacy of realistic climate protection solutions that make sense for global environmental and economic interests." — Mark Widmar, Chief Executive Officer

Trade association

Utah Clean Energy Association

Is your position on climate change consistent with theirs?

Consistent

Please explain the trade association's position

Utah Clean Energy leads and accelerates the clean energy transformation with vision and expertise. They are committed to creating a future that ensures healthy, thriving communities for all, empowered and sustained by clean energy. Through advocacy, education, and diverse partnerships, Utah Clean Energy continues to advance renewable energy and energy efficiency in Utah and the Western Region. Today, Utah Clean Energy has become Utah's independent resource for clean energy policy, regulatory, and consumer information.

How have you influenced, or are you attempting to influence their position?

As a board member, First Solar participates in and is supportive of the association's overall mission and programs to advance the clean energy agenda.

Trade association

North Carolina Clean Energy Business Association

Is your position on climate change consistent with theirs?

Consistent

Please explain the trade association's position

The NC Clean Energy Business Alliance strengthens the political voice for clean energy through education, outreach, and direct lobbying of decision-makers. NCCEBA advocates for a business-friendly environment for clean energy businesses at all levels,

from the North Carolina Utilities Commission, Public Staff, and other agencies, to Federal, County, and local levels. NCCEBA's team of lobbyists work with legislators and government officials to make sure clean energy business interests are well represented at the North Carolina General Assembly and with the Governor's Office.

How have you influenced, or are you attempting to influence their position?

As a board member, First Solar participates in and is supportive of the association's overall mission and programs to advance the clean energy agenda.

Trade association

Renewable Energy Buyers Association (REBA)

Is your position on climate change consistent with theirs?

Consistent

Please explain the trade association's position

REBA is an alliance of large clean energy buyers, energy providers, and service providers that, together with NGO partners, are unlocking the marketplace for all nonresidential energy buyers to lead a rapid transition to a cleaner, prosperous, zero-carbon energy future.

REBA's theory of change: Large energy consumers have the buying power and collective voice to change markets. Energy buyers have a unique, critical role in driving a zero-carbon energy future.

How have you influenced, or are you attempting to influence their position?

As a governing board member, we provide fiscal oversight and guidance on strategy.

Trade association

American Chamber of Commerce to the EU

Is your position on climate change consistent with theirs?

Consistent

Please explain the trade association's position

The American Chamber of Commerce to the EU is the voice of American companies invested in Europe. It is a horizontal association, regrouping companies of all sectors, but very effective at making the voice of American FDI heard in Brussels. It has over 150 company members, and its policy work is organized in committees on specific policy areas. AmCham EU has always advocated for a stable and predictable framework for investments to tackle climate change. As such, the association denounced the decision of the President of the United States to withdraw from the Paris Agreement. In AmCham EU's view, the Paris Agreement provides clear goals, as well as a balanced and cost-efficient approach to reduce emissions. AmCham EU is committed to sustainable growth and believes the fight against climate change will bring about long-term value creation in the US and EU.

How have you influenced, or are you attempting to influence their position?

As a board member, First Solar participates in and is supportive of the association's overall mission. As one of the member companies at the forefront of the clean energy agenda, we help inform the association's messaging on the EU Green Deal and other clean energy topics. First Solar chairs the association's Communications Group, and led its Environment Committee for 4 years.

Trade association

MDV-SEIA

Is your position on climate change consistent with theirs?

Consistent

Please explain the trade association's position

Maryland D.C. Virginia Solar Energy Industry Association (MDV-SEIA) is the second-largest state affiliate of the Solar Energy Industries Association (SEIA) with over 160 member organizations, representing over 10,000 solar jobs in the region. Through direct advocacy, policy formation, regulatory intervention and market representation, MDV-SEIA strives to develop and implement strong solar policies to ensure continued market formation for all solar segments in this region and beyond.

How have you influenced, or are you attempting to influence their position?

As a board member, First Solar participates in and is supportive of the association's overall mission and programs to advance the clean energy agenda.

C12.3d

(C12.3d) Do you publicly disclose a list of all research organizations that you fund?

No

C12.3e

(C12.3e) Provide details of the other engagement activities that you undertake.

1. IEA Photovoltaic Power Systems (PVPS) Program
 - i) First Solar engages through a group by participating in the IEA's PV task committee 12.
 - ii) IEA PVPS Task 12 aims to foster international collaboration on PV safety and sustainability by quantifying the environmental profile of PV in comparison to other energy technologies and defining and addressing Environmental, Health, and Safety (EHS) and sustainability issues that are important for market growth.
 - iii) First Solar engages by contributing to the development of methodology guidelines, best practice white papers, reports, scientific articles, and participation in international expert workshops. First Solar was a contributing author to a publication on end-of-life management of photovoltaic panels, which was published by the IEA PVPS Task 12 and the International Renewable Energy Agency (IRENA). Through its leadership of the Strategy Committee of SolarPower Europe (a member organization of the IEA PVPS), First Solar co-leads the task 12 as deputy operating agent.

iv) First Solar supports the development of internationally accepted and harmonized standards for life cycle assessment, along with minimum standards for EHS in manufacturing and deployment of PV power systems, and best practice exchange within the industry and policymakers.

2. International Renewable Energy Agency (IRENA)

i) First Solar engages through a group of leading renewable energy advocates from both industry and civil society.

ii) IRENA focuses on enabling the transition to renewable energy for a sustainable energy future.

iii) As a Coalition for Action member organization, First Solar has committed to supporting the energy transition by promoting the sustainable use of renewable energy technologies; making a compelling case for renewable energy by collectively compiling the latest knowledge and examples; communicating renewable energy with the public through clear, truthful messages; addressing public concerns over renewable energy technologies by applying best practices and engaging concerned parties; sharing evidence, communications material, ideas and contacts with fellow Coalition members to strengthen the cases and support for renewable energy.

iv) As a founding member of the coalition, First Solar supports all objectives and commitments to promote the energy transition through the sustainable use of renewable energy technologies.

C12.3f

(C12.3f) What processes do you have in place to ensure that all of your direct and indirect activities that influence policy are consistent with your overall climate change strategy?

Our vision "to lead the world's sustainable energy future" drives every aspect of our business strategy from developing sustainable solar markets, reducing our operational impacts, increasing the efficiency of our products, reducing the levelized cost of solar electricity to compete with fossil fuels, and improving the environmental benefits offered by our technology on a life cycle basis. First Solar established a global Sustainability program in 2011 to bring together all sustainability related activities across the company under one initiative. First Solar's Sustainability program drives the company's environmental, social, and economic priorities; including life cycle carbon footprint analysis and GHG intensity reduction goal, responsible land use, waste management, supply chain sustainability and our industry-leading recycling services. First Solar's strategy includes engagement with key policy makers in all our markets and at regional and international level to promote the development and deployment of PV solar as a solution to climate change and energy security, and advocate policies that facilitate these goals. First Solar's Public Affairs team is responsible for guiding public policy that drives demand for solar in target markets, monitoring relevant legislative and regulatory proceedings, advancing First Solar's project pipeline, and managing worldwide stakeholder engagement. First Solar's Public Affairs team works closely with Business Development, the Sustainability and EHS teams, and the Executive Leadership Team to support the development of solar PV energy projects in various markets as part of our mission to provide cost-advantaged solar

technology through innovation, customer engagement, industry leadership, and operational excellence.

C12.4

(C12.4) Have you published information about your organization's response to climate change and GHG emissions performance for this reporting year in places other than in your CDP response? If so, please attach the publication(s).

Publication

In voluntary sustainability report

Status

Underway – previous year attached

Attach the document

 FirstSolar_SustainabilityReport_2018.pdf

Page/Section reference

1; 17-19; 37

Content elements

Governance
Strategy
Risks & opportunities
Emissions figures
Emission targets
Other metrics

Comment

2020 sustainability report will be available from this link: http://www.firstsolar.com/-/media/First-Solar/Sustainability-Documents/FirstSolar_Sustainability-Report_2020.ashx

Publication

In voluntary communications

Status

Underway – previous year attached

Attach the document

 First-Solar-Sustainability-Metrics-26SEP19.pdf

Page/Section reference

9-10

Content elements

Strategy
Emissions figures
Emission targets
Other metrics

Comment

Publication

In mainstream reports

Status

Complete

Attach the document

 First-Solar-2019-Annual-Report-vPost.pdf

Page/Section reference

16; 26

Content elements

Strategy
Risks & opportunities
Other metrics

Comment

Other metrics highlighted in our annual report include our carbon footprint, energy payback time, and water footprint advantage

C15. Signoff

C-FI

(C-FI) Use this field to provide any additional information or context that you feel is relevant to your organization's response. Please note that this field is optional and is not scored.

C15.1

(C15.1) Provide details for the person that has signed off (approved) your CDP climate change response.

	Job title	Corresponding job category
Row 1	Chief Quality and Reliability Officer	Other C-Suite Officer

Submit your response

In which language are you submitting your response?

English

Please confirm how your response should be handled by CDP

	I am submitting to	Public or Non-Public Submission
I am submitting my response	Investors	Public

Please confirm below